### {{name}}

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | {{school}} | | | | |
| **ACADEMIC UNIT** | {{department}} | | | | |
| **LEVEL OF STUDIES** | {{level}} | | | | |
| **COURSE CODE** | {{code}} | **SEMESTER** | | {{examino}} | |
| **COURSE TITLE** | {{name}} | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
| {{didactivities\_name1}} | | | {{didactivities\_hours1}} | | {{didactivities\_ects1}} |
| {{didactivities\_name2}} | | | {{didactivities\_hours2}} | | {{didactivities\_ects2}} |
|  | | |  | |  |
| *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* | {{type}} | | | | |
| **PREREQUISITE COURSES:** | {{prereq}} | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | {{lang}} | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | {{erasmus}} | | | | |
| **COURSE WEBSITE (URL)** | {{website}} | | | | |

**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* | |
| {{learn\_objectives}} | |
| **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*  *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…*  *…….* |
| {{skills}} | |

**SYLLABUS**

|  |
| --- |
| {{subject1}}  {{subject2}}  {{subject3}} |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | {{teaching\_way}}. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | {{techs\_used}} |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | {{task1}} | {{hours1}} | | {{task2}} | {{hours2}} | | {{task3}} | {{hours3}} | | {{task4}} | {{hours4}} | | {{task5}} | {{hours5}} | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***{{hours\_sum}}*** | |
| **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.* | {{grading}} |

**ATTACHED BIBLIOGRAPHY**

{{refs\_books}}

### Linear Algebra and Analytical Geometry

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ002 | **SEMESTER** | | 1st | |
| **COURSE TITLE** | Linear Algebra and Analytical Geometry | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 3 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to use: 1. basic concepts in Linear Algebra (tables, determinants, linear systems – homogeneous/non homogeneous), vector transformations through an array (eigenvalues and eigenvectors, similarity transformations) 2. Vector analysis and vector operations 3. Basic concepts of Analytical Algebra on the level of surface theory for the field of Civil Engineering. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  - Working independently  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| 1.Introduction to Arrays and array operations, determinant of a square matrix .2. Calculation of determinant of greater dimension by analysis into sum of sub-determinants. 3. Allowed operations, calculation of determinant using the triangulation method. 4. Matrix multiplication, properties, permissible row operations on matrices. 5. Inverse of a square matrix and methods of inversion. 6. Linear systems. 7. The concept of vectors. 8. Vectors in space. 9-10. Analytical Geometry in the plane. 11. Analytical Geometry in space. 12. Elements of surface theory. 13. Vector transformations. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Poweroint presentations, Excel, Matlab/Octave, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 39 | | Individual study |  | | Practice/exercises |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 - open-ended questions (30-40%)  - problem - solving questions (70-60%) |

**ATTACHED BIBLIOGRAPHY**

- [in Greek]. Τερζίδης Χαράλαμπος, Λογισμός συναρτήσεων μιας μεταβλητής με στοιχεία διανυσματικής  
 γραμμικής άλγεβρας, Εκδόσεις Χριστοδουλίδης, Θεσσαλονίκη 2006  
- [In Greek]. Σουρλάς Δημήτρης, Γραμμική Άλγεβρα και Αναλυτική Γεωμετρία , Εκδόσεις Πανεπιστημίου  
Πατρών, 2013  
- [In Greek]. Μπράτσος Αθανάσιος, Μαθήματα Ανώτερων Μαθηματικών, ISBN 978-960-603-030-7,  
[ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική  
Διεύθυνση: https://repository.kallipos.gr/handle/11419/424  
[In Greek]. Παπαϊωάννου Σταύρος, Βογιατζή, Δέσποινα, Μαθηματικά Ι, ISBN 978-960-603-427-5,  
[ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική  
Διεύθυνση: https://repository.kallipos.gr/handle/11419/4551

### Differential and Integral Calculus Ι

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ001 | **SEMESTER** | | 1st | |
| **COURSE TITLE** | Differential and Integral Calculus Ι | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
| Lectures | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to use: 1. Sets of numbers with an emphasis on complex numbers 2. The real functions of a real variable (definition, limits, continuity) 3. Basic concepts of calculus 4. Basic concepts of differential calculus 5. Their implementations on the field of Civil Engineering. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  - Working independently  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Course presentations: 1. Sets of numbers (natural, real, integer). Complex numbers (definition, complex plane, trigonometric form of a complex number, De Moivre’s theorem, exponential form, Euler’s formula). 2. The cartesian coordinate system, functions of a real variable, polynomial functions, properties. 3-4. Functions of a real variable, exponential and logarithmic functions, hyperbolic functions, properties, periodic functions, trigonometric and inverse circular functions, the concept of limit and the definition of a function of a real variable 5. The concept of derivative of a number and the derivative of a real variable 6-7. Derivative of a composite function, derivative of inverse functions, higher order derivatives, fundamental theorems, conclusions about f(x) derived from the first and second derivatives, extrema. Taylor and Maclaurin series, vector functions and their derivatives 8. Indefinite Integration, definition, basic types, and properties, methods of integration. 9. Methods of indefinite integration 10. Definite integration 11. Generalized integrals, integrals with variable limits and their differentiation, integration of functions defined on two intervals, integrals in polar coordinates, volume of a solid of revolution 12-13. Application of definite integration on the field of Civil Engineering. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Poweroint presentations, Excel, Matlab/Octave, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study |  | | Practice/exercises |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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  - open-ended questions (30-40%)   - problem - solving questions (70-60%) |

**ATTACHED BIBLIOGRAPHY**

[In Greek]. Τερζίδης Χαράλαμπος, Λογισμός συναρτήσεων μιας μεταβλητής με στοιχεία διανυσματικής  
 γραμμικής άλγεβρας, Εκδόσεις Χριστοδουλίδης, Θεσσαλονίκη 2006  
[In greek]. Hass J., Heil C., Weir M.D., Απειροστικός Λογισμός, Πανεπιστημιακές Εκδόσεις Κρήτης,  
Κρήτη 2005, ISBN 978-960-524-515-3, Κωδικός στον Εύδοξο: 77107082  
[In greek]. Μπράτσος Αθανάσιος, Μαθήματα Ανώτερων Μαθηματικών, ISBN 978-960-603-030-7,  
[ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική  
Διεύθυνση: https://repository.kallipos.gr/handle/11419/424  
[In greek} Παπαϊωάννου Σταύρος, Βογιατζή, Δέσποινα, Μαθηματικά Ι, ISBN 978-960-603-427-5,  
[ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική  
Διεύθυνση: https://repository.kallipos.gr/handle/11419/4551

### Geodesy Ι

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ001 | **SEMESTER** | | 1st | |
| **COURSE TITLE** | Geodesy Ι | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
| Lectures and Practice | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr | | | | |

**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* | |
| • Understand the principles of operation of basic surveying instruments. • Conduct field measurements using a theodolite and the tachymeter-stadia system. • Possess the theory of basic surveying applications: measurement of horizontal and vertical angles, distance measurement, photogrammetric mapping, geometric and trigonometric leveling, and apply them in practice. • Be able to draw topographic diagrams. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Decision-making \_Working independently \_Team work \_Applying knowledge \_Respect for difference and multiculturalism  \_Criticism and self-criticism  \_Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Topics covered in the course include:  Introduction to topography. Error theory. Instruments and methods for angle measurements. Instruments and methods for distance measurements. Instruments and methods for altitude differences measurements. Advances in instrument and measurement technology. Mapping of detailed points. Area and volume calculations. Land distribution. Production of a topographic diagram. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 26 | | Individual study | 52 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Inferential Assessment. • Laboratory assignment • Oral examination • Written final examination including: o Theoretical Extended Response Questions (formative and/or inferential) o Problem-solving exercises The present course description with the assessment criteria is accessible to students in the Department's Study Guide (Department Website). |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Μαθήματα Γεωδαισίας, 2η Έκδοση, Γεωργόπουλος Γ., Εκδόσεις Τζιόλα.  
• [In Greek] Γεωδαισία Ι: Γεωδαιτικές μετρήσεις και υπολογισμοί, Σαββαϊδης Π., Υφαντής Ι., Δούκας Ι., Εκδόσεις Κυριακίδη.  
• [In Greek] Εφαρμοσμένη Γεωδαισία, Λάμπρου Ε., Πανταζής Γ., Εκδόσεις Ζήτη.  
• [In Greek] Στοιχεία Τοπογραφίας, Στυλιανίδης Ε., Εκδόσεις Δίσιγμα.  
• [In Greek] Εφαρμοσμένη Τοπογραφία, Τόμος Α’, 3η Έκδοση, Καριώτης Γ., Παναγιωτόπουλος Ε., Εκδόσεις Δίσιγμα.**

### Physics for Engineers

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ003 | **SEMESTER** | | 1st | |
| **COURSE TITLE** | Physics for Engineers | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 5 | | 6 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | http://teachers.teicm.gr/vozikis/Physics/index.html | | | | |

**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* | |
| Upon completing this course students should be able to approach a problem qualitatively, analyze and interpret what is happening, plan the solution based on basic principles and mathematical tools, verify the results and identify possible improvements. | |
| **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*  *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…*  *…….* |
| The course promotes the following skills: - Working independently  - Team work - Decision-making  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Theory topics  Mathematical background, Material point engineering, Introduction to oscillations, Solid state mechanics, Heat and temperature.  Laboratory exercises aim to introduce students to the essence and correct practices of the experimental process, finding and correcting measurement errors, processing the results and deriving conclusions. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Webpage for the course, E-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 19 | | Practice/exercises | 6 | | Project(s) | 9 | | Individual study | 82 | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***156*** | |
| **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.* | Theory examination (90%) - mid-term exmams: open ended questions, problem solving questions (30%) - final exams: open ended questions, problem solving questions (60%) Laboratory exams (10%) Written assignment for every laboratory exercise. |

**ATTACHED BIBLIOGRAPHY**

[In Greek]. Young H., Freedman R., University Physics with Modern Physics – Vol Α, Papazisi (Ed), 2009, ISBN:978-960-02-2338-5
  
[In Greek]. Halliday D., Resnick R., Walker J., Physics – Vol Α, Gutenberg (Ed.), 2012, ISBN:978- 960-01-1493-5
  
[In Greek]. Fragiadakis, I., Physics and Technology, Ziti (Ed.) 2006, ISBN:960-431-854-3
  
[In Greek]. Mylonas, N, David, K, Physics, Engineering and Electromagnetism, Tziolas (Ed.) 2019, ISBN: 978-960-418-837-6
  
[In Greek]. Kleidis, K. Vozikis, C., Physics – Engineering, TEI Central Macedonia 2017, http://teachers.teicm.gr/vozikis/Physics/theory/Physics-notes.pdf

### Technical Drawing

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ001 | **SEMESTER** | | 1st | |
| **COURSE TITLE** | Technical Drawing | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
| Lectures, exercises. | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/ | | | | |

**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* | |
| Upon completing this course students should be able to corelate real world geometry with graphic representations through projection, observe geometric principles in the built environment and relate them to graphic representations, represent 3D objects in 2D orthographic projections, produce hand-drawing projections of buildings in scale (plans, sections, elevations), use lineweights to convey spatial information, identify building components in orthographic drawings, read symbols related to the structure and the building components, organize drawings in sheets and place appropriate dimensions for drawings in the scale of 1:50. | |
| **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*  *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…*  *…….* |
| Search for, analysis and synthesis of data and information, with the use of the necessary technology, Project planning and management  Adapting to new situations, Decision-making, Working independently, Team work, Production of free, creative and inductive thinking. | |

**SYLLABUS**

|  |
| --- |
| The course is structured in two parts: the first part is dedicated to introducing the main principles of descriptive geometry and the relation of physical objects with their geometrical representation on paper. Students work on exercises on descriptive geometry, surface developments and orthographic projections. The second part implements the orthographic projections on the drawing of objects is space. The students learn to measure, document and produce orthographic projections of physical objects in scale drawings (1:5). They learn to make orthographic projections of buildings in scale (1:100, 1:50), axonometric projections, while at the same time they get acquainted with the building’s structure and components. The students submit 3 projects of paper and ink drawings at the end of the semester, while they also participate in a final examination on technical drawing. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises |  | | Individual study | 35 | | Project(s) | 43 | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Compulsory individual assignements.(40% of final grade) Final written examinations: short-answer questions, drawing assignment (60% of final grade). |

**ATTACHED BIBLIOGRAPHY**

Malikouti, St. “TECHNICAL DRAWING: Elements of theory and methodology for applications”, Sygxroni Publications, Athens, 2018. (in Greek)  
Malikouti, St., Markopoulou, N., “ARCHITECTURAL DRAWING: Methodology for drawing in scale of 1:50”, Sygxroni Publications, Athens, 2017. (in Greek)  
Pavlidis, I., “Line Drawing”, Ziti Publications, Thessaloniki, 1997, (in Greek)  
Bayouk, S., “Technical Drawing”, Sofia Publications, Thessaloniki, 2016. (in Greek)  
Markatis, S., “Descriptive Geometry”, TSOTRAS Publications, Athens, 2016. (in Greek)  
Fountas, Gr., “Descriptive Geometry”, Fountas Publications, Athens, 2005. (in Greek)  
Lefkaditis, G., “Elements of Descriptive Geometry Part I”, private publication, Athens, 2010. (in Greek)  
Lefkaditis, G., “Elements of Descriptive Geometry Part II”, private publication, Athens, 2008. (in Greek)  
Lefkaditis, G., “Methods of Representation: Axonometry, Altimetry, Rendering”, private publication, Athens, 2006. (in Greek)  
Ching Fr., “Architectural Graphics”, 6th edition, John Wiley and Sons, Inc., New Jersey, 2015

### Building Materials Technology I

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ002 | **SEMESTER** | | 1st | |
| **COURSE TITLE** | Building Materials Technology I | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course, students should be able to identify:  the properties of building materials, manufacturing technologies, structure correlation and properties and the mechanical behavior of building materials. | |
| **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*  *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…*  *…….* |
| Autonomously working, Teamwork, Decision making, Exercise criticism and self-criticism,  Promotion of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Introduction to the structure of materials. Physical and mechanical properties. • Characteristics, properties of natural stones and rocks. • Structural rocks - Aggregate materials: Types, characteristics and properties. • Powders: Definitions, Types, Production methods, Coagulation and hardening mechanisms. Aerial and hydraulic powders. • Cement: Raw materials, Production, Portland cement. Hydration. Special types of cements. • Pozzolanic reaction. Physical, chemical and mechanical properties of cements. • Mortars: Composition. Categories. Properties - characteristics (Adhesion, strength, durability). • Introduction to masonry (Types, strengths). • Ceramic Materials (Optobricks: Properties, Strengths). • Introduction to concrete. • Introduction to steel materials. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 52 | | Individual study |  | | Educational visit |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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.* | The final written exam at the end of the semester comprises: Theoretical questions of knowledge and critical thinking, problem solving. |

**ATTACHED BIBLIOGRAPHY**

[In Greek] A. Triantafyllou, (2017). Structural Materials, GOTSIS Publishers.   
[In Greek] P. Kumar Mehta, P.J.M. Monteiro. Concrete: Microstructure, Properties, and Materials, Publ. McGraw Hill.

### Basic IT tools - Writing scientific documents

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ009 | **SEMESTER** | | 1st | |
| **COURSE TITLE** | Basic IT tools - Writing scientific documents | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 1 | | 0 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | General Knowledge | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to explain computer functions and operations, outline the benefits for civil engineers, choose and evaluate Internet resources, comply with third-party intellectual rights. | |
| **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*  *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…*  *…….* |
| The course promotes the following skills: - Working independently  - Team work - Decision-making  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Computer operating systems, Windows basic operations, introduction to Word, (equations, tables, images, shapes, alignment, headers, footers), Introduction to Excel (programming simple problems, graphical representations and processing of experimental data and functions,), IF command, solving problems in Linear Algebra using predefined functions, rules for writing scientific texts, structure of a scientific assignment, bibliography and references, searching scientific databases, intellectual rights and plagiarism (use of third-party text, images, shapes), references in text. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, course webpage, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***0*** | |
| **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 examination (, open ended questions, problem solving questions) |

**ATTACHED BIBLIOGRAPHY**

[In Greek]. Kavousanos, E., Applications of mathematical calculus - Excel presentations, Benou (Ed.), - Παρουσίαση με την χρήση του excel, Εκδόσεις Μπένου, 2012, ISBN: 978-960-8249-93-6
  
[In Greek]. Kouimtzis, N. Comptaional Excel application for engineers, Zit (Ed.) 2006, ISBN: 960-431-994-9
  
[In Greek]. Vozikis Christos, Intellectual property rights: clearing Open Academic Courses from third-party Intellectual property rights., TEI Central Macedonia Creative Commons: Attribution-ShareAlike 4.0

### Engineering Mechanics Ι

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ004 | **SEMESTER** | | 2nd | |
| **COURSE TITLE** | Engineering Mechanics Ι | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Students' understanding of the effect of forces and moments on the static equilibrium of planar linear undeformed structures. The development of static sensing on the adequacy of links with the view to achieve rigid and determinate truss structures. The ability to calculate and evaluate the axial forces developed in the members of truss structures and the displacements of the nodes. | |
| **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*  *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…*  *…….* |
| Creating the necessary background to enable a full understanding of the concepts and techniques of static solution of truss structures and of the calculation of the center of gravity of surfaces. | |

**SYLLABUS**

|  |
| --- |
| • Introduction to Engineering. Principles of vector calculus. Force and moment. Moment of a force with reference to a point and about an axis. Force couple. Parallel force transfer. Reduction of a system of forces. • Composition of concurrent and parallel forces – graphic and analytical calculation of the resultant. Decomposition of forces into components. Forces in space. • Calculation of the area of surfaces and determining the center of gravity of simple and complex surfaces. • Rigid body equilibrium conditions. Mechanisms, determinate and indeterminate structures, degrees of freedom, types of supports of structures.  • Free-body diagram. Calculation of support reactions. • Truss structures. Formation - members. Analytical method of nodes. The method of Ritter sections. • Complex trusses. Three-hinge trusses. • Principle of virtual work. Calculation of node displacements of truss |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks in order to investigate the understanding of the concepts taught.  2. Final written exam at the end of the semester (in Greek).  3. Each student is given the opportunity to check his examination paper and have his mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

• http://users.teilar.gr/~p.lokkas/Stat.pdf  
• [in Greek] Βαρδουλάκη Ι., Γιαννακόπουλου Α. «Τεχνική Μηχανική Ι», Εκδόσεις Συμμετρία 2004.  
• [in Greek] Ν. Αραποστάθη, Δ. Αραποστάθη. «Τεχνική Μηχανική – Μηχανική Ι», Εκδόσεις Ίων, 2007.  
• [in Greek] Π. Βουθούνη. «Μηχανική Απαραμόρφωτου Στερεού», Εκδόσεις Α. Βουθούνη, 2017.  
• [in Greek] Beer F., Johnston E.R., Mazurek D., «Στατική – Τεχνική Μηχανική», Εκδόσεις Τζιόλα, 2018  
• [in Greek] Θ. Γεωργόπουλου, «Στατική του απαραμόρφωτου σώματος», Έκδοση Π. Γεωργόπουλος, 2018.  
• Hassan Al Nageim, «Structural Mechanics: Loads, Analysis, Design and Materials», Prentice Hall, 2003.  
• R. Hulse, «Structural Mechanics», Red Globe Press, 2000.  
• Hulse, R. Cain, J., «Structural Mechanics», Macmillan, 1994.

### Probabilities and Statistics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ005 | **SEMESTER** | | 2nd | |
| **COURSE TITLE** | Probabilities and Statistics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 3 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to use combinatorial analysis, theory of probability, basic consensus statistics, basic distribution functions, implement in valuation issues and use regression-correlation. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: - Working independently  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Combinatorial analysis, basic concepts in Statistics, census statistics, statistical measures of central tendency, probabilities (concepts and exercises), probability distribution functions in discrete random variables, polynomial and exponential probability distribution functions, valuation, confidence intervals for the difference of means, fundamentals of time series. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Poweroint presentations, Excel, Matlab/Octave, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 39 | | Individual study |  | | Practice/exercises |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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 - open-ended questions (30-40%)  - problem - solving questions (70-60%) |

**ATTACHED BIBLIOGRAPHY**

[In Greek] Zafeiropoulos, K., Introduction to Statistics and probabilities, Kritiki (Ed), Thessaloniki, 2017, ISBN: 9789605861476  
[In Greek] Chalikias, I., Statistics: method of analysis for business decisions, Rosili (Ed). Athens, 2017.   
[In Greek] Zafeiropoulos, K., Mylonas, N., Statistic with SPSS, Tziolas (Ed). Thessaloniki, 2017, ISBN 9789604186808  
[In Greek] Papaioannou, S. Course notes: http://pde.teiser.gr/papaioannou/stoixia\_pithanotiton\_statistikis.asp

### Differential and Integral Calculus ΙΙ

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ004 | **SEMESTER** | | 2nd | |
| **COURSE TITLE** | Differential and Integral Calculus ΙΙ | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to use: functions of most variables and recognize their graphic representations 2. The concepts of partial derivative and total differential 3. The solving of double and triple integrals 4. Basic concepts of Differential Geometry 5. Line integrals and surface integrals. 6. Implement the above in the field of Civil Engineering. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  - Working independently  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Course content: 1. Introduction to functions of two real variables, examples of graphical representations, sphere, ellipsoid, paraboloid, cone, intersection of surfaces and planes, domain and definition of continuity for z=f(x, y). 2. The concept of partial derivative, physical and geometric interpretation, types and theorems of partial derivatives. The concept of total differential, higher-order partial derivatives. 3. Study of extrema, the problem of least squares, constrained extrema 4. Double Integrals, their physical and geometric interpretation, properties, and methods of computation. Types of integration domains 5. Double integrals, change of variables. Polar Coordinates. Generalization of the Change of Variables Problem, moment of Inertia of a Plane Surface. 6. Triple Integrals. Physical Interpretation. Properties and Computation Methods 7-9. Fundamental knowledge of vector analysis: scalar and vector fields, vector functions. Derivative of a vector function. Angular velocity. Uniform circular motion. Arc length of a curve. Derivative of z=f(x,y) in a given direction. Integration of vector functions. Gradient of scalar fields. Divergence and curl of vector fields 10-11. Line integrals (definition, properties and calculation methods). Path-independent line integrals. Conservative vector fields. 12. Surface integrals (definition, properties and calculation methods). 13. Stokes' theorem and Gauss's Divergence theorem. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Poweroint presentations, Excel, Matlab/Octave, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study |  | | Practice/exercises |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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  - open-ended questions (30-40%)  - problem - solving questions (70-60%) |

**ATTACHED BIBLIOGRAPHY**

[In Greek]. Τερζίδης Χαράλαμπος, Λογισμός συναρτήσεων μιας μεταβλητής με στοιχεία διανυσματικής
  
 γραμμικής άλγεβρας, Εκδόσεις Χριστοδουλίδης, Θεσσαλονίκη 2006
  
[In greek]. Hass J., Heil C., Weir M.D., Απειροστικός Λογισμός, Πανεπιστημιακές Εκδόσεις Κρήτης,
  
Κρήτη 2005, ISBN 978-960-524-515-3, Κωδικός στον Εύδοξο: 77107082
  
[In greek]. Μπράτσος Αθανάσιος, Μαθήματα Ανώτερων Μαθηματικών, ISBN 978-960-603-030-7,
  
[ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική
  
Διεύθυνση: https://repository.kallipos.gr/handle/11419/424
  
[In greek} Παπαϊωάννου Σταύρος, Βογιατζή, Δέσποινα, Μαθηματικά Ι, ISBN 978-960-603-427-5,
  
[ηλεκτρ. βιβλ.] Αθήνα: Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Ηλεκτρονική
  
Διεύθυνση: https://repository.kallipos.gr/handle/11419/4551

### Geodesy ΙΙ

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ002 | **SEMESTER** | | 2nd | |
| **COURSE TITLE** | Geodesy ΙΙ | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 5 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to: • use basic knowledge on reference systems and coordinate transformations and be able to convert basic topographic quantities into different reference surfaces. • perform topographic measurements by conducting polygonal traverses, calculating coordinates of detailed points using specific methods. • apply different methods of leveling determination, such as simple geometric leveling, trigonometric leveling, precise trigonometric leveling, etc. • design topographic diagrams and be able to mark topography points in a land field. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: -Team work -Applying knowledge -Working in an interdisciplinary environment | |

**SYLLABUS**

|  |
| --- |
| Topics covered in the course include: - Transform coordinates between different coordinate systems - Describe the characteristics of geodetic datums and projection systems - Apply in practice the proccedures involved in tacheometric surveying - Apply different leveling techniques such as differential and trigonometric leveling. - Create survey plans and find the location a of specific points on the construction site - Polygonometry method. resection and intersection traverse.  - Surveying Definition, Types, Methods and checks. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 39 | | Practice/exercises | 26 | | Project(s) | 26 | | Individual study | 39 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Inferential Assessment. • Laboratory assignment • Oral examination • Written final examination including: o Theoretical Extended Response Questions (formative and/or inferential) o Problem-solving exercises The present course description with the assessment criteria is accessible to students in the Department's Study Guide (Department Website). |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Εφαρμοσμένη Γεωδαισία, Λάμπρου Ε., Πανταζής Γ., Εκδόσεις Ζήτη.  
• [In Greek] Μαθήματα Γεωδαισίας, 2η Έκδοση, Γεωργόπουλος Γ, Εκδόσεις Τζιόλα.  
• [In Greek] Γεωδαισία ΙΙ: Τοπογραφικές Αποτυπώσεις -Χαράξεις, Σαββαϊδης Π., Υφαντής Ι., Δούκας Ι., Εκδόσεις Κυριακίδη.  
• [In Greek] Εφαρμοσμένη Τοπογραφία, Τόμος Β’, 2η Έκδοση, Παναγιωτόπουλος Ε., Καριώτης Γ., Συμεωνίδης Π., Εκδόσεις Δίσιγμα.**

### Constructional Drawing through Computer Aided Design

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ003 | **SEMESTER** | | 2nd | |
| **COURSE TITLE** | Constructional Drawing through Computer Aided Design | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
| Lectures, exercises, assignements. | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr | | | | |

**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* | |
| Upon completing this course students should be able create 2D digital drawings of buildings (plans, sections, elevations) as well as masterplans of their surrounding area. Drawings are to be complete with constructional information for the scale of 1:50. They should be able to organize layouts, sheet drawings, plot and publish them respectively, exchange files and share information through .dwg files, keep up with software updates and finally establish a background for engaging with similar CAD systems. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: 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, Criticism and self-criticism, Production of free, Creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| The course introduces students to AutoCAD software in order to provide them with the knowledge and skill to digitally design 2D representations of buildings, working through scales of 1/100 to 1/50. Students learn thoroughly Drawing and Modify commands, along with Annotations, Dimensioning and Insertion options, achieving accuracy with Drafting Settings and supporting all architectural drafting conventions. Drawings are plotted in scales, organised in layouts and sheets to be published. Students also learn to organize project files, templates and exchange efficiently drawing information within AutoCAD environment as well as with other applications. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 13 | | Practice/exercises | 28 | | Project(s) | 24 | | Individual study | 39 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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.* | Compulsory individual assignements. (20% of final grade) Final examination: short-answer questions, multiple choice, drawing assignment in AutoCAD (80% of final grade). |

**ATTACHED BIBLIOGRAPHY**

Malikouti, St., Markopoulou, N., “ARCHITECTURAL DRAWING: Methodology for drawing in scale of 1:50”, Sygxroni Publications, Athens, 2017. (in Greek)  
Omura, G., Benton, B.C., “Mastering AutoCAD 2019 and AutoCAD LT 2019”, Sybex, 1st edition, 2018.  
Kappos, I. “Working with AutoCAD 2017”, Kleidarithmos Publications, Athems 2017. (in Greek)  
Kappos, I. “Introduction to AutoCAD 2010”, Kleidarithmos Publications, Athems 2010. (in Greek)  
Tzouvadakis, I., Gousis, Ch., “2D 3D drawing in AutoCAD”, Symmetria Publications, Athens, 2007. (In Greek).  
Veneris, I., “INFORMATICS AND ARCHITECTURE: concepts and technologies”, Tziolas Publications, Thessaloniki, 2011. (In Greek).  
Kourniatis, N., “Techniques of representation with geometrical methods and contemporary digital media”, Tziolas Publications, Thessaloniki, 2018. (In Greek).

### Computer Programming

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ006 | **SEMESTER** | | 2nd | |
| **COURSE TITLE** | Computer Programming | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 3 | | 3 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to define the way computers work, basic principles of programming, the value of computers for civil engineering, build short programs for engineering applications, calculate numerical problems for civil engineering though computer programming. | |
| **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*  *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…*  *…….* |
| - Working independently  - Team work  - Decision-making  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Introduction to programming. Algorithms and flowcharts. Matlab environment (Octave). Command line. Constants, variables, arrays, library functions. Arithmetic operations with scalar variables and arrays. Help commands and files. Writing programs. .m Files. Input and output commands (input, disp, fprintf). User-defined functions using inline. Program execution. Debugging. Decision-making statements (if, switch). Looping statements (for, while). Counters, accumulators. Array indexing. Graphical representations. Plotting commands (plot, figure, hold, axis, xlabel, ylabel, title, plot3). 3D graphs (meshgrid, mesh, surf, contour). User-defined functions using the 'function' keyword. function calls. recursion. Data files, reading, writing. Symbolic toolbox. Symbolic variables, functions, roots, derivatives, integrals, differential equations. Data modeling: curve fitting, curve fitting in Matlab |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | The course is taght in a computer cluster room with Matlab/(Octave clone) and open source GNU |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 13 | | Practice/exercises | 26 | | Individual study | 39 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***78*** | |
| **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.* | Written final examination (50% of the final grade) that includes:  • Open ended questions  • Problem-solving exercises  • Group written assignment (2/3 students) (30% of the final grade)  • Individual laboratory work during the course (20% of the final grade). |

**ATTACHED BIBLIOGRAPHY**

-[In Greek]. Γραββάνης Γιώργος, Γιαννουτάκης Κωνσταντίνος, Προγραμματισμός με τη Χρήση Matlab,
  
Εκδόσεις Α. ΠΑΠΑΣΩΤΗΡΙΟΥ ΣΙΑ ΟΕ, 2012, ISBN: 978-960-491-057-1
  
-[In Greek]. Stormy Attaway, Matlab: Μια πρακτική εισαγωγή στον προγραμματισμό και την επίλυση
  
προβλημάτων, Εκδόσεις Κλειδάριθμος ΕΠΕ, 2016, ISBN: 978-960-461-663-3
  
-[In Greek]. Musto J., Howard W., Williams R., Υπολογιστική Μηχανική με Matlab και Excel, Εκδόσεις
  
Τζιόλα, 2015, ISBN: 978-960-418-504-7

### Building Materials Technology ΙΙ

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ005 | **SEMESTER** | | 2nd | |
| **COURSE TITLE** | Building Materials Technology ΙΙ | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to have an in-depth knowledge of concrete and steel reinforcement properties and apply concrete and steel regulations and criteria. | |
| **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*  *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…*  *…….* |
| Autonomously working, Teamwork, Decision making, Exercise criticism and self-criticism,  Promotion of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Concrete: Raw materials, additives and admixtures. Composition study - Grainometric curves.  • Freshly-mixed concrete: Properties, Distribution, Placing, Maintenance, Taking samples. Using concrete in special conditions.• Hardened concrete: Microstructure. Strengths, Volume stability. Durability. Compliance Criteria, Acceptance of a Load or Batch of Concrete.• Special Concretes: Self-Compacting, High Strength, Reinforced, Gunite. •Steel Reinforcement: Production methods, nomenclature, Properties and technical characteristics. Corrosion. Steel welding. Quality compliance of steel reinforcement. Forming of steel reinforcement in constructions. • Concrete and Steel Regulations. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Individual study | 52 | | Practice/exercises |  | | Educational visit |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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.* | The final written exam at the end of the semester comprises: Theoretical questions of knowledge and critical thinking, problem solving. |

**ATTACHED BIBLIOGRAPHY**

[In Greek] A. Triantafyllou, (2017). Structural Materials, GOTSIS Publishers.   
[In Greek] P. Kumar Mehta, P.J.M. Monteiro. Concrete: Microstructure, Properties, and Materials, Publ. McGraw Hill.

### Geology for Engineers

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ001 | **SEMESTER** | | 3rd | |
| **COURSE TITLE** | Geology for Engineers | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Process, analyze, and utilize information related to the role of geological formations and structures, as well as groundwater, in the environment and in technical projects.  • Evaluate the geotechnical behavior of geological formations under different conditions.  • Assess potential geotechnical hazards and make decisions regarding preventive measures and/or mitigation.  • Evaluate environmental parameters and hazards based on the hydrogeological and mechanical characteristics of geological formations. | |
| **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*  *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…*  *…….* |
| Search for, analysis and synthesis of data and information, using the necessary technologies  • Work in an interdisciplinary environment  • Autonomous work  • Decision making  • Project planning and management  • Criticism and self-criticism  • Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Content of lectures: -Creation-composition and evolution of the earth, theory of lithospheric plates. -General Geology (stratigraphy, tectonics, fundamental concepts, illustrations on maps). -Geomorphology, disintegration, erosion, karst phenomena with an emphasis on their effects on the environment and on technical projects. -Earthquakes. Genesis, valuation, seismic risk, effects on technical projects and the environment.  -Geotechnical problems: groundwater, landslides, settlements and effects on technical projects .   -Classifications of geological formations. Rock mass classification (RQD, GSI)  Exercise Contents: -Geometric orientation of geological interfaces -Topographic maps  -Construction of geological sections -Geological Sections and assessment of subsoil geotechnical conditions -Rock mass classification |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | -Additional material is provided via a dedicated e-learning website  -Zoom platform  -Communication via e-mail |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Individual study | 52 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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 exam at the end of the semester that comprises:  -Theoretical questions of knowledge and critical thimking, problem solving, multiple choice test.  -Individual project |

**ATTACHED BIBLIOGRAPHY**

1. [In Greek]. G. Koukis, N. Sambatakakis. Technical Geology 2nd Edition. Papasotirio Publications. Athens 2019. ISBN: 978-960-471-130-1   
 2. [In Greek]. Seraphim Savvidis. Environmental Engineering Geology. S.G.S. Publications Seraphim G. Savvidis, Kozani 2014. ISBN: 978-618-80374-0-3   
 3. [In Greek]. Dimitris Papanikolaou, Geology, The Science of the Earth, S. Patakis Publications, 2007.   
 4. F. G. Bell. Engineering Geology 2nd. Ed. Elsevier Ltd. 2007  
 5. John C. Lommler. Geotechnical Problem Solving. John Wiley Sons, 2012.

### Theory of Elasticity

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ006 | **SEMESTER** | | 3rd | |
| **COURSE TITLE** | Theory of Elasticity | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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 familiarization of students with the concepts of stress and strain in continuous elastic media and the stress-strain relationship in the elastic region. Understanding the equilibrium and compatibility equations. The use of boundary conditions. The ability to apply analytical, energy, and numerical methods to determine deformations in truss and solid structures. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Stresses. Normal and shear stress. Stress tensor. Equations of equilibrium.  • Basic principles of elasticity – plasticity. Continuous media. Homogeneous – isotropic materials. Small and large deformations. Second-order phenomena. Static and dynamic loads.  • Change of coordinate system. Transformation of stresses.  • Principal stresses – principal axes. Mohr's circles. Invariants of stresses. Three-dimensional and plane stress state.  • Deformations. Strain tensor. Laws of material behavior, stress-strain relationship. Compatibility equations.  • Linear elasticity. Constitutive equations. Mechanical characteristics of materials. Hooke's law. Modulus of elasticity. Poisson's ratio. Shear modulus. Elasto-plastic materials.  • Properties of fluids. Viscosity.  • Boundary conditions. Principle of superposition. Saint Venant's principle. Plane stress state. Plane strain state.  • Airy stress function. Solving two-dimensional problems in orthogonal and polar coordinates. Boundary conditions.  • Lamé's constants. Elasticity equations. P and S wave velocities. Speeds of propagation.  • Energy methods. Strain energy. Maxwell - Betti reciprocity theorem. Castigliano's theorem. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Gdoutos E. «Theory of Elasticity», Symmetria publications 2003 (in Greek)  
http://eclass.opencourses.teicm.gr/eclass/modules/document/file.php/TMB111/FULL.pdf  
Timoshenko S, Goodier G.N. «Theory of Elasticity», McGraw-Hill, 1969.  
Timoshenko S, «Theory of Elasticity», McGraw-Hill, 1987.  
L. D. Landau, E. M. Lifshitz, «Theory of Elasticity», Pergamon Press, 1989.  
A.I. Lurie, «Theory of Elasticity», Springer Science Business Media, 2010.

### Environmental Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ001 | **SEMESTER** | | 3rd | |
| **COURSE TITLE** | Environmental Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 3 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to: • know the concepts of climate change, the ozone hole, acid rain • understand the conditions of air pollution and water pollution • know the processes of wastewater treatment • design a sewage treatment plant • dimension the sewage treatment tanks • be aware of the limitations and peculiarities in the construction of such projects • know the limits of pollutants that can be discharged from a Wastewater Treatment Plant | |
| **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*  *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…*  *…….* |
| • Decision making  • Respect for the natural environment  • Autonomous work  • Adaptation to new situations | |

**SYLLABUS**

|  |
| --- |
| • Principles of aerosol cleaning. Emission sources of pollutants in the atmosphere. Removal of gaseous pollutants. Particulate removal from static source emissions. Technologies for destroying pollutants emitted by mobile sources • Principles - methods of water treatment. Quality of potable water • Solid waste management and processing. Management of urban waste • Climate change, ozone hole, acid rain • Toxic substances, asbestos, lead, dioxins  • Principles of biological wastewater and sludge treatment. Environmental biochemistry-biotechnology elements: Microorganisms, biochemical reaction kinetics. Wastewater treatment technology: Qualitative and quantitative characteristics of wastewater. Sewage treatment. Separation grids. Sand collectors. Physico-chemical treatment. Sedimentation tanks. Biological processes of suspended and attached biomass. Natural wastewater treatment systems. Disinfection. Sludge treatment technology: Qualitative and quantitative characteristics of sludge. Sludge thickening. Sludge immobilization/digestion. Dewatering, drying, and burning of sludge. Final disposal and/or reuse of treated wastewater and sludge. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 26 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***78*** | |
| **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.* | 1. Assignment of tasks aimed at exploring understanding of concepts taught. 2. Final written exam at the end of the semester (in Greek). |

**ATTACHED BIBLIOGRAPHY**

• Ath. Kougolou "ENVIRONMENTAL ENGINEERING, Pollution Environmental Protection", Tziolas Publications, 2018, ΙSΒΝ: 9789604185627 [in Greek]  
• Avloniti A. Stamati "Environmental Engineering, I - Introduction to Water and Liquid Waste Technology", ION Publications, 2013, ΙSBN 978-960-508-056-3 [in Greek]  
• George Tchobanoglous, H. David Stensel, Ryujiro Tsuchihashi, Franklin L. Burton “Wastewater Engineering: Treatment and Resource Recovery”, Metcalf Eddy Inc, 2013, ISBN: 9780073401188  
• Nelson L. Nemerow, Franklin J. Agardy, Patrick J. Sullivan, Joseph A. Salvato “Environmental Engineering: Prevention and Response to Water, Food, Soil, and Air borne Disease and Illness”, Wiley, 2009, ISBN: 9780470083048  
• R Wane Schneiter “Environmental Engineering Practice PE Exams”, Professional Publications Inc, 2007, ISBN: 1591260019

### Building Construction I

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ007 | **SEMESTER** | | 3rd | |
| **COURSE TITLE** | Building Construction I | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to: • understand the principal parts of a building construction: excavations, foundations, bearing structure of buildings, masonry, thermal and moisture protection, roofs, stairs, floors • read and create construction drawings • search relevant information over building construction issues in a variety of sources (books, scientific papers, internet sites) • implement the aforementioned information for solving building construction issues in a documented way (detailed drawings, technical reports) • perceive the knoweledge received as a part of the whole building construction planning and utilize it construction | |
| **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*  *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…*  *…….* |
| • Research, analysis and combination of information • Adaptation to new situations  • Decision making  • Autonomous and team work  • Project planning and performing  • Respect to natural environment  • Critical mindset  • Promotion of creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| The course is an introduction to Building Construction and aims to develop the logic of solving construction problems in a building project. Introduces theoretical and technical knowledge on issues of insulation, building materials as well as the relationship between design and construction. An introduction is also made to the concept of the energy performance of the building, its energy footprint and the regulations governing them.  Students work on a project, both individually and in groups. For this project they are given drafts of a building and are asked to proceed with the design of the basic construction plans (wooden formwork, joints and details of structural elements, drawing of stairs, roofs), incorporating the insulation required in every element. Moreover, they are invited to cultivate the logic of searching for construction solutions through the combination of knowledge and information received from a variety of sources: books, technical brochures, examples of constructed buildings on the Internet. Their proposal should be substantiated theoretically and design-wise. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | • Powerpoint presentation of lectures • Support of the learning process (educational material) through the E-learning platform and a video conference platform. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 25 | | Practice/exercises | 25 | | Individual study | 30 | | Project(s) | 30 | | Project(s) | 20 | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exams on theory and design, with questions of short development on construction issues, as well as solving a small design project (50%) Delivery of group project (mandatory), which is processed during the semester, with supervision of each group throughout the whole semester (50%) |

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• ΚΤΙΡΙΟ [http://www.ktirio.gr/]

### Differential Equations

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ007 | **SEMESTER** | | 3rd | |
| **COURSE TITLE** | Differential Equations | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to work with the definition of differential equations for usual problems, differential equations of 1st order, linear differential equations of 2nd order with constant coefficients, the concept and method of solving of the monophase oscillator, linear systems of differential equations, the concept and method of solving of he bilevel oscillator, Fourier series and Laplace transforms. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: - Working independently  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Introduction to differential equations, differential equations of 1st order, (homogeneous, linear, Bernoulli, complete, Ricatti) differential equations of 2nd order (constant coefficients, single stage forced oscillator), systems of differential equations, method of solving of he bilevel oscillator, Fourier series and Laplace transforms. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Poweroint presentations, Excel, Matlab/Octave, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study |  | | Practice/exercises |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 - open-ended questions (30-40%)  - problem - solving questions (70-60%) |

**ATTACHED BIBLIOGRAPHY**

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[In Greek]. Terzidis C., Mathematical methods of signal processing (Laplace and Fourier Transforms) Anikoula (Ed.)Thessaloniki, 2006 ISBN: 960-516-029-3
  
[In Greek]. Hass J., Heil C., Weir M.D., Infinite calculus, University Ed. Crete, Crete, 2015, ISBN 978-960-524-515-3
  
[In Greek]. Bratsos A., Lessons on Higher mathematics, ISBN 978-960-603-030-7, [e-book] HEAL-Link, https://repository.kallipos.gr/handle/11419/424
  
[In Greek]. Papaioannou, S. Course notes, http://pde.teiser.gr/papaioannou/Mathimatika\_2.asp

### Engineering Mechanics ΙI

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ008 | **SEMESTER** | | 3rd | |
| **COURSE TITLE** | Engineering Mechanics ΙI | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Students' understanding of the concept of external loads and their connection to the internal forces developed in planar solid undeformed structures. The possibility of identifying and forming statically determinate beams - frames. The ability to calculate and evaluate the axial - shear forces and bending moments that develop in the members of the solid structures. The ability to determine critical sections. The application of energy methods for the calculation of displacements - rotations of cross-sections of solid structures. | |
| **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*  *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…*  *…….* |
| Acquisition of specialized knowledge for the conception, design and static solution of solid determinate structures, calculation of internal forces and critical sections. | |

**SYLLABUS**

|  |
| --- |
| • Solid structures. Internal Forces. Beams – Frames. • Concentrated and distributed loads. Method of sections. Diagrams of internal forces N, V, M and their properties. • Simply supported beam and diagrams of internal forces for various types of loading. Single and double cantilever simply supported beam. Cantilever beam. • Substitute beam. Construction of N, V, M beam diagrams with the beam substitute method and the method of integrals.  • Hinged beam (Gerber). Reactions, N, V, M diagrams.  • Static solution of solid and hinged determinate frame structures.  • Principle of virtual work. Calculation of displacements – rotations of cross sections of solid structures.  • Application of the direct stiffness method to calculate the displacements of trusses. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks in order to investigate the understanding of the concepts taught.  2. Final written exam at the end of the semester (in Greek).  3. Each student is given the opportunity to check his examination paper and have his mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

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• [in Greek] Βαρδουλάκη Ι., Γιαννακόπουλου Α. «Τεχνική Μηχανική Ι», Εκδόσεις Συμμετρία 2004.  
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• [in Greek] Π. Βουθούνη. «Μηχανική Απαραμόρφωτου Στερεού», Εκδόσεις Α. Βουθούνη, 2017.  
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• Hassan Al Nageim, «Structural Mechanics: Loads, Analysis, Design and Materials», Prentice Hall, 2003.  
• R. Hulse, «Structural Mechanics», Red Globe Press, 2000.  
• Hulse, R. Cain, J., «Structural Mechanics», Macmillan, 1994.

### Traffic Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ003 | **SEMESTER** | | 3rd | |
| **COURSE TITLE** | Traffic Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=480 | | | | |

**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* | |
| Upon completing this course students should be able to recognize the traffic flow variables and their mathematical relations as well as concepts of traffic capacity, calculate traffic capacity and level of service of basic road elements, to calculate a signalized intersection and implement methods of traffic data collection. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Trip generation and characteristics, land transportation system, traffic flow variables, traffic volume and flow rate, speed, traffic density and occupancy, space headway and time headway, time-space diagrams, fundamental traffic flow relationship, traffic flow diagrams, patterns and statistical distributions of traffic flow, traffic capacity, level of service, interrupted and uninterrupted flow, service flow rate, performance measures and service measures, demand and volume, functional classification of road networks, cross sections, urban roads, classification of urban roads, speeds, levels of service, service volumes, calculation of traffic capacity (unsignalized intersections, two lane highways, multilane highways, basic freeway segments, freeway weaving, ramps and ramp junctions), traffic signalization, warrants, traffic signal design, traffic light coordination, traffic data collection methods. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 52 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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 exam (100%) which includes:  - Open ended questions  - Problem solving questions (exercises)    The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Αντωνίου, Κ., Σπυροπούλου, Ι. (2016). Αρχές Κυκλοφοριακής Τεχνικής και Προσομοίωσης. Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", ISBN: 978-960-603-306-3.  
• [In Greek] Φραντζεσκάκης, Ι.Μ., Γκόλιας, Ι.Κ., Πιτσιάβα-Λατινοπούλου, Μ.Χ. (2009). Κυκλοφοριακή Τεχνική. Α. ΠΑΠΑΣΩΤΗΡΙΟΥ ΣΙΑ Ι.Κ.Ε., ISBN: 978-960-7182-42-5.  
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• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 1: Λειτουργική Κατάταξη Οδικού Δικτύου (ΟΜΟΕ- ΛΚΟΔ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.  
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### Strength of Materials

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ009 | **SEMESTER** | | 4th | |
| **COURSE TITLE** | Strength of Materials | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| • Evaluation of materials according to the laws of behavior. • Understanding the response and behaviour due to various loads. • Ability to dimension structural elements. Selection of critical sections. • Calculation of deformations - displacements. • Assessment of structural material failure. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Classification of materials. Behavior law of structural steel. Proportional limit, elasticity, and yield point. Strengthening. Necking phenomenon. Behavior law of ductile materials.  • Bending theory: Moment of inertia. Pure bending. Bending with axial force. Biaxial bending. Neutral axis. Cross-section core.  • Pure shear. Shear due to bending of symmetrical sections. Distribution of shear stresses along the height.  • Elastic line of a beam. Calculation of the elastic line - deflection of beams using the method of double integration.  • Torsion theory: Torsion of beams of circular cross-section and cross-section of circular ring. Torsion of beams with rectangular cross-section.  • Buckling of rods and columns. Combined stress of a beam with axial and transverse loads. Large deformations of structures subjected to bending, second-order phenomena.  • Applications of deformation compatibility conditions.  • Material failure: Density theory of the rotational energy of deformations (Mises), maximum shear stress theory (Tresca), internal friction theory (Mohr - Coulomb).  • Cyclic loads. Material fatigue.  • Creep and relaxation of materials. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

http://users.teilar.gr/~p.lokkas/Ant\_Yl.pdf  
R. L. Mott, «Applied Strength of Materials», CRC Press, 2015.  
Vouthounis P.: «Strength Materials and Mechanics of Deformable Bodies», Vouthounis publ., 2017 (in Greek).  
Vardoulakis Ι., «Mechanics of Deformable Solids Bodies ΙΙ», Symmetry publ., 1999 (in Greek).  
Tsamasfyeos G., «Mechanics of Deformable Bodies Ι», Symmetry publ., 1990 (in Greek).  
Velaoras G. «Strength of Materials». 2nd ed. Ion publ., 1997 (in Greek).  
Beer F. - Johnston R. - DeWolf J. - Mazurek D., «Mechanics of Materials», Tziolas, 2015.

### Fluid Mechanics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ002 | **SEMESTER** | | 4th | |
| **COURSE TITLE** | Fluid Mechanics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to recognize the basic rules governing fluid mechanics, hydrostatics, fluid flow and energy euations. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information \_Decision-making \_Working independently \_Respect for the natural environment \_Production of free, creative and inductive thinking. | |

**SYLLABUS**

|  |
| --- |
| • Basic properties of fludis. • Hydrostatics. • Flow dynamics.. • Navier-Stokes euations. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 32 | | Practice/exercises | 10 | | Practice/exercises | 10 | | Project(s) | 10 | | Individual study | 68 | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Language of Evaluation: Greek. Written test with extended answer questions (formative and/or inferential). Theory assessment (90% of the final grade): • A written progress examination (30% of the final grade) including: \_Theoretical Extended Response Questions (formative and/or inferential) \_Problem-solving exercises. • Written final examination (60% of the final grade) including: \_Theoretical extended response questions (formative and/or inferential) \_Problem-solving exercises. Laboratory assessment (10% of the final grade): • Written assignment on laboratory exercises. The present course description with the assessment criteria is accessible to students in the Departmental study guide (Departmental website) and on the course website. The outline is communicated orally to students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [in Greek} Πρίνος Παναγιώτης, Μηχανική ρευστών, Εκδόσεις Ζήτη, 2014, ISBN: 978-960-456-419-4, Κωδικός Βιβλίου στον Εύδοξο: 41963463  
• [in Greek} Λιακόπουλος Αντώνης, Μηχανική Ρευστών, Εκδόσεις Τζιόλα, 2019 (2η έκδοση), ISBN: 978- 960-418-774-4, Κωδικός Βιβλίου στον Εύδοξο: 77107657  
• [in Greek} Τσακογιάννης Ιωάννης, Μηχανική των ρευστών, Εκδόσεις Επίκεντρο, 2005, ISBN: 978-960- 6645-09-9, Κωδικός Βιβλίου στον Εύδοξο: 15023  
• [in Greek} Αυλωνίτης Δημήτρης, Αυλωνίτης Σταμάτης, ΜΗΧΑΝΙΚΗ ΡΕΥΣΤΩΝ Ι, Εκδόσεις Τσότρας, 2020 (5η έκδοση), ISBN: 978-618-5309-95-4, Κωδικός Βιβλίου στον Εύδοξο: 94645124  
• [in Greek] Παπαϊωάννου Άγγελος, Μηχανική των Ρευστών, Εκδόσεις Σοφία, 2019 (3η έκδοση), ISBN: 978-960-633-004-9, Κωδικός Βιβλίου στον Εύδοξο: 86055189

### Structural Analysis I – Determinate structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ012 | **SEMESTER** | | 4th | |
| **COURSE TITLE** | Structural Analysis I – Determinate structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | http://elearning.teicm.gr/course/view.php?id=504 | | | | |

**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* | |
| Understand equilibrium and the behavior of determinate structures. Analyze statically determinate structures, such as Beams, Frames, Trusses, Mixed Structures, Continuous Frames and strengthened Structures subject to various permanent loadings. Draw bending, shear and axial force diagrams of determinate structures. Understand and apply the principle of virtual work. | |
| **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*  *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…*  *…….* |
| -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 interdisciplinary environment  -Project planning and management  -Criticism and self-criticism  -Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| 2D structures. Internal forces, fundamental and composite structural systems. Simply supported Beams and Frames. Three-hinged arches. Trusses and suspended systems. Influence lines. Extreme values – Envelopes. Energy principles. Calculation of displacements. 3D structures. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Communication via e-mail and Zoom platform. Additional material is provided via a dedicated e-learning website. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Formative evaluation consisted of:  1.Non-compulsory intermediate tests (2 to 3 in total) focused on solving problems (30% of final mark) 2. Final written exams that includes: a. Theoretical questions of knowledge and critical thinking and b .Solving of problems-exercises (70% of final mark) |

**ATTACHED BIBLIOGRAPHY**

Ghaliand, A. and Neville, A.M.(1989), Structural Analysis, a unified classical and and Matrix Approach, Chapman and Hall publication.   
Valiasis Th. (1997), Statics of Linear Structures, Thessaloniki: Ziti publication (in Greek).  
W.Wagner and G. Erlhog (2012), Applied Statics, ΚΛΕΙΔΑΡΙΘΜΟΣ publication (Greek translation from German).

### Soil mechanics Ι

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ002 | **SEMESTER** | | 4th | |
| **COURSE TITLE** | Soil mechanics Ι | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=427 | | | | |

**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 aim of the course is to help the student understand the basic principles of Soil Mechanics, to consolidate knowledge regarding the behavior of the “soil” as a civil engineering material and to develop the ability to computationally address basic problems in classic applications of Soil Mechanics. Upon successful completion of the course, the student will be able to: • Recognize, comprehend and be able to classify the basic physical and mechanical properties of soil. • Distinguish and understand the parameters related to soil behavior. • Calculate the stresses developing in the soil deposit due to the weight of the soil itself as well as due to external loading, and also estimate the soil shear strength and the stability of soil slopes. • Combine individual soil characteristics and be able to differentiate and adapt the assessment and computation procedures based on the particular parameters of each case under consideration. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search, analysis and synthesis of data and information  • Decision-making  • Working independently  • Project planning | |

**SYLLABUS**

|  |
| --- |
| Description of the fundamental principles of soil behavior and introduction to the topics of soil stresses, soil deformations, and soil stability. Introduction to theoretical Soil Mechanics concepts aimed at using appropriate soil parameters for each type of problem.    Content of theory lectures:  • Physical and mechanical properties of soils.  • Laboratory measurements and field tests.  • Water flow in porous soils and its effect on he mechanical behavior of the soil.  • Soil stresses and deformations.  • Shear strength of soil.  • Stability of soil slopes.  Content of laboratory exercises:   • Introduction to issues related to the control and testing of the physical and mechanical soil properties.   • Laboratory determination of soil moisture content.   • Laboratory determination of soil specific weight and unit weight.   • Particle size analysis of soil.   • Laboratory determination of Atterberg limits (liquid limit, plastic limit, shrinkage limit).   • Soil Proctor compaction test.   • Determination of soil density.   • Unconfined compression test (determination of soil uniaxial compression strength).   • Direct shear test (determination of soil shear strength). |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam that includes: • Theoretical judgment questions on course subjects (short answer questions and multiple-choice questions). • Solving of theory problems-exercises. • Solving of laboratory exercises. Submission of assignments and oral examination that includes: • Laboratory exercises solving. • Solving of theory problems-exercises. • Examination of understanding of course basic concepts. |

**ATTACHED BIBLIOGRAPHY**

⦁ **[In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0  
⦁ [In Greek] Καββαδάς Μ. (2016), "Στοιχεία Εδαφομηχανικής (2η έκδοση)", Εκδόσεις Τσότρας, ISBN: 978-618-5066-62-8  
⦁ [In Greek] Κολέτσος Κ., (2004), "Γεωτεχνική Μηχανική", Εκδόσεις University Studio Press, ISBN: 978- 960-12-1256-2  
⦁ [In Greek] Γραμματικόπουλος Ι., Ανδρεάδου-Μάνου Ν., Χατζηγώγος Θ. (2015), "Εδαφομηχανική: ασκήσεις και προβλήματα (2η έκδοση)", Αφοι Κυριακίδη, Θεσσαλονίκη, ISBN: 978-618- 5105-87-7  
⦁ [In Greek] Χρηστάρας Β., Χατζηαγγέλου Μ. (2011), "Απλά βήματα στην Εδαφομηχανική", University Studio Press, Θεσσαλονίκη, ISBN: 978-960-12-1935-6  
⦁ [In Greek] Budhu Μ. (2020), "Εδαφομηχανική και Θεμελιώσεις", Εκδόσεις Gotsis, Πάτρα, ISBN: 978- 960-9427-90-6  
⦁ Das B.M. (2019), "Advanced Soil Mechanics" , Taylor and Francis (5th edition), New York.  
⦁ Verruijt A. (2018), "An Introduction to Soil Mechanics", Springer.**

### Numerical Analysis

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ008 | **SEMESTER** | | 4th | |
| **COURSE TITLE** | Numerical Analysis | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | http://teachers.teicm.gr/vozikis/NumericalAnalysis/index.html | | | | |

**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* | |
| Upon completing this course students should be able to recognize the importance of algorithm usage and be able to assess the reliability of their results, understand the utility of numerical methods as fundamental components of design programs and scientific computations, apply numerical methods to compute solutions for large linear systems, find roots of nonlinear equations, calculate areas of complex regions and solve simple differential equations. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  - Working independently  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| The course deals with basic methods of Numerical Analysis that are analyzed and applied using the Matlab software. Topics covered include solving nonlinear equations and linear/nonlinear systems, interpolation, numerical differentiation, numerical computation of definite integrals, solving differential equations, and solving systems of differential equations. Additionally, the application of these methods to problems in Civil Engineering is studied. In the laboratory part of the course, the methods presented in the theoretical lectures are applied using the Matlab (Octave) software on a computer. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | The course is taght in a computer cluster room with Matlab/(Octave clone) and open source GNU |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 13 | | Practice/exercises | 13 | | Project(s) | 16 | | Individual study | 62 | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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  - open-ended questions (30-40%)   - problem - solving questions (70-60%) |

**ATTACHED BIBLIOGRAPHY**

- [In Greek]. Παπαϊωάννου Σ., Βοζίκης Χ. ‘Εισαγωγή στην Αριθμητική Ανάλυση’, Εκδόσεις Ελληνικά
  
Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016, ISBN:978-960-603-379-7
  
-[In Greek]. Σαρρής Ι., Καρακασίδης Θ., Αριθμητικές Μέθοδοι και Εφαρμογές για Μηχανικούς, Εκδόσεις
  
Τζιόλα, 2015, ISBN: 978-969-418-520-7
  
-[In Greek]. Chapra S., Canale R., Αριθμητικές Μέθοδοι για Μηχανικούς, Εκδόσεις Τζιόλα, 2016, ISBN:
  
978-960-418-542-9

### Reinforced Concrete I

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ010 | **SEMESTER** | | 4th | |
| **COURSE TITLE** | Reinforced Concrete I | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=192 http://panagop.civil.ihu.gr/?page\_id=29 | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: 1. Understand the properties and mechanical behavior of materials (concrete, steel). 2. Identify the limit states used in structural design and apply appropriate combinations of actions. 3. Design linear reinforced concrete members (beams, columns) in the ultimate limit state for normal stress (bending with axial force). 4. Design linear reinforced concrete members (beams, columns) in the ultimate limit state for shear. 5. Apply reinforcement and detailing rules for linear structural elements in accordance with the current regulations. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Historical overview of the use of reinforced concrete (R/C) as a building material and the regulatory provisions that prescribe its application. Introduction to the individual materials of reinforced concrete and their properties  • Design loads. Presentation of the limit state method  • Structural design of building elements (reinforcement covers, anchorages, laps, etc.)  • Introduction to the dimensioning of structural elements for normal stress values  • Dimensioning of reinforced concrete beams in bending and shear  • Dimensioning of reinforced concrete columns in uniaxial and biaxial bending  • Dimensioning of beams in shear |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 20 | | Individual study | 58 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught (30%). 2. Final written exam (in Greek) at the end of the semester (70%). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Karavezyroglou-Weber M., Elements of Calculation and Configuration of Solid Structures. 3rd ed, Tziolas publ., 2016 (in Greek)  
Tsonos A.D., Design of Reinforced Concrete Structures I, Sofia publ., 2017 (in Greek)  
Penelis G., Stylianidis K., Kappos A., Ignatakis Ch., Design of Reinforced Concrete Structures According to the New Concrete and Seismic Codes, AUTh publ., 1995 (in Greek)  
Georgopoulos Th., Reinforced Concrete I, Georgopoulos publ., 2015 (in Greek)

### Hydraulics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ003 | **SEMESTER** | | 5th | |
| **COURSE TITLE** | Hydraulics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to recognize the basic rules governing hydraulic flow in civil engineering systems related to water distribution in open channels and closed pipes. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information \_Decision-making \_Working independently \_Respect for the natural environment \_Production of free, creative and inductive thinking. | |

**SYLLABUS**

|  |
| --- |
| Description of the fundamental principles of water behavior and introduction to the topics of flow in open channels and closed pipes. Introduction to methods for the hydraulic analysis and design of water networks    Content of theory lectures:  • Physical and mechanical properties of soils.  • Laboratory measurements and field tests.  • Water flow in porous soils and its effect on he mechanical behavior of the soil.  • Soil stresses and deformations.  • Shear strength of soil.  • Stability of soil slopes. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 32 | | Practice/exercises | 10 | | Practice/exercises | 10 | | Project(s) | 10 | | Individual study | 68 | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Language of Evaluation: Greek. Written test with extended answer questions (formative and/or inferential). Theory assessment (90% of the final grade): • A written progress examination (30% of the final grade) including: \_Theoretical Extended Response Questions (formative and/or inferential) \_Problem-solving exercises. • Written final examination (60% of the final grade) including: \_Theoretical extended response questions (formative and/or inferential) \_Problem-solving exercises. Laboratory assessment (10% of the final grade): • Written assignment on laboratory exercises. The present course description with the assessment criteria is accessible to students in the Departmental study guide (Departmental website) and on the course website. The outline is communicated orally to students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Πρίνος Παναγιώτης, Υδραυλική Κλειστών και Ανοικτών Αγωγών, Εκδόσεις Ζήτη, 2013, ISBN: 978-960-456-344-9. Κωδικός Βιβλίου στον Εύδοξο: 22767973  
• [In Greek] Λιακόπουλος Αντώνης, Υδραυλική, Εκδόσεις ΤΖΙΟΛΑ, 2020 (3η έκδοση), ISBN: 978-960-418- 775-1. Κωδικός Βιβλίου στον Εύδοξο: 77107649  
• [In Greek] Στάμου Αναστάσιος, Εφαρμοσμένη Υδραυλική, Εκδόσεις Παπασωτηρίου, 2016 (3η έκδοση), ISBN: 978-960-491-109-7. Κωδικός Βιβλίου στον Εύδοξο: 59397206  
• [In Greek] Σούλης Ιωάννης, ΥΔΡΑΥΛΙΚΗ, Εκδόσεις ΧΑΡΑΛΑΜΠΟΣ ΝΙΚ. ΑΪΒΑΖΗΣ, 2012, ISBN: 978-960- 549-001-0. Κωδικός Βιβλίου στον Εύδοξο: 22714197  
• [In Greek] Δημητρακόπουλος Αλέξανδρος, ΣΤΟΙΧΕΙΑ ΥΔΡΑΥΛΙΚΗΣ ΚΛΕΙΣΤΩΝ ΚΑΙ ΑΝΟΙΚΤΩΝ ΑΓΩΓΩΝ, Εκδόσεις GOTSIS, 2018, ISBN: 978-960-9427-72-2. Κωδικός Βιβλίου στον Εύδοξο: 77119353

### Urban planning, urban space implementation of building regulations

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ011 | **SEMESTER** | | 5th | |
| **COURSE TITLE** | Urban planning, urban space implementation of building regulations | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=739 | | | | |

**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* | |
| Upon completing this course students should be able to: • Recognize and define Urban Planning and Urban Design concepts - Understand and use of the relevant terminology – Analyze small urban areas.  • Understand the purpose of and be able to apply basic Building Regulations connected to Urban Planning and the urban space formation and production in the contemporary Greek city. • Design (preliminary level – scale 1:100) an urban apartment building of medium architectural complexity, in accordance with the implementation of Regulations: real time data regarding legislation and the site. Also, optimize the configuration of the uncovered area at ground floor level, with a focus on neighborhood sustainability issues.  • Evaluate buildings’ and urban areas’ problems connected with the implementation (or poor implementation) of Urban Planning civic rules and legislation. Provide solutions/ improvement proposals that give incentives for the sustainability of small urban areas and the Greek city. • Participate in urban planning upgrading task-groups of engineers, aiming at rehabilitating existing parts of the city. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_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 interdisciplinary environment  \_Project planning and management \_Respect for difference and multiculturalism  \_Respect for the natural environment \_Criticism and self-criticism \_Production of free, creative and inductive thinking | |

**SYLLABUS**

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| --- |
| The course introduces students to basic concepts of Urban Planning, focusing on the scale of urban space and the objectives of Urban Design. This point of view is also enhanced with aspects of the relevant legislation, as an attempt to connect the public space of the Greek city (form, function, development) with regulations that determine its production in recent decades. Urban phenomena are examined on the basis of sustainability, starting macroscopically and gradually approaching the scale of urban units and buildings. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures |  | | Practice/exercises |  | | Project(s) |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | The evaluation of the students is made up of the following: A. Performance in final written exam: 50% of the final grade, B. Quality of exercises, assignments, and design projects (developed during the semester): 40% of the final grade, C. Participation in the course procedures (i.e. oral participation, meeting deadlines for handing in written work): 10% of the final grade.  The evaluation criteria are listed in the introductory handout of the course, which is posted on the e-learning platform in the beginning of the semester and is also distributed and presented to the students during the 1st class meeting. |

**ATTACHED BIBLIOGRAPHY**

\_Aravantinos, Athanasios, 2007. Urban Planning (2nd revised edition). Athens: Simmetria Editions [in Greek].  
\_Andrikopoulou, Eleni, Giannakou, Athina, Kafkalas, Grigoris, Pitsiava-Latinopoulou, Magda, 2014. City and urban planning practices (2nd revised edition). Athens: Kritiki Editions [in Greek].  
\_Melissas, Dimitrios, 2015 (3rd ed.). New building regulations (Law 4067/2012) – Interpretation of each article. Athens: Sakkoulas Editions [in Greek].  
\_Moshaki, Evdokia Mara, Sofia, 2016 (5th ed.). New Building Regulations: The law 4067/2012 as updated and validated in present. Athens: Dedemadis Editions [in Greek].  
\_Siolas, A., Vassi, A., Vlastos, T., Kyriakidis, X., Siti, M., Bakogiannis, E., 2015. Methods, applications and tools of urban planning. [e-book]. Athens: Association of Greek Academic Libraries (Kallipos). Available at: http://hdl.handle.net/11419/5409 [in Greek].

### Highway Engineering I

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ004 | **SEMESTER** | | 5th | |
| **COURSE TITLE** | Highway Engineering I | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=743 | | | | |

**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* | |
| Upon completing this course students should be able to recognize basic principles of geometric design of roads, familiarize with road design guidelines and standards, to analyze, judge and synthesize different criteria of road design and to implement all the above through relative applications. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Working independently \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Course presentations: • Introduction. Design and construction of road projects. • Regulations. Design procedure and methodology. • Basic concepts and definitions. • Road safety by design (criteria). • Start of road design. • Horizontal alignment. • Vertical alignment. Super elevation diagrams. • Cross sections. • Road widening study. • Visibility study |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 52 | | Project(s) | 26 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises) OR  Final written exam (70%) + Optional individual assignment (30%).   The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Αποστολέρης, Α.Κ. (2015). Οδοποιία Ι – Χαράξεις και Υπολογισμός Χωματισμός, Θεωρία και Πρακτική. Αναστάσιος Κ. Αποστολέρης, ΑΠΟΣΤΟΛΕΡΗΣ ΚΑΙ ΣΙΑ Ο.Ε., ISBN: 9789609371735.
  
• [In Greek] Κοφίτσας, Ι.Δ. (2009). Στοιχεία Οδοποιίας. Ίων, ΣΤΕΛΛΑ ΠΑΡΙΚΟΥ ΣΙΑ ΟΕ, ISBN: 978-960- 411-185-5.
  
• [In Greek] Natzschka, H. (2014). Οδοποιία: Σχεδιασμός και Κατασκευή. ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, ISBN: 978-960-461-583-4.
  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 1: Λειτουργική Κατάταξη Οδικού Δικτύου (ΟΜΟΕ- ΛΚΟΔ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.
  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 2: Διατομές (ΟΜΟΕ-Δ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.
  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 3: Χαράξεις (ΟΜΟΕ-Χ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.
  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 4: Κύριες Αστικές Οδοί (ΟΜΟΕ-ΚΑΟ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.
  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 5: Πρόσθετες Λωρίδες Κυκλοφορίας (ΟΜΟΕ-ΠΛΚ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.**

### Structural Analysis II – Indeterminate structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ014 | **SEMESTER** | | 5th | |
| **COURSE TITLE** | Structural Analysis II – Indeterminate structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | http://elearning.teicm.gr/course/view.php?id=228 | | | | |

**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* | |
| Comprehend the degree of indeterminacy. Analyse statically indeterminate structures. Compute, displacements and rotations. Determine the influence of temperature changes and support movements on structural response | |
| **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*  *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…*  *…….* |
| -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 interdisciplinary environment  -Project planning and management  -Criticism and self-criticism  -Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Introduction to statically indeterminate structures. Differences between statically determinate and indeterminate structures Deformation Method (Method of Nodal Displacements). Application to plane structures. Symmetry of structures and loading.Support retreat, settlements, elastic supports, thermal loads. Force Method. Application to plane structures, frames and trusses. Comparison to the Deformation Method  Influence lines of indeterminate structures. Müller-Breslau Principle. Computation of the extreme response values. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Communication via e-mail and Zoom platform. Additional material is provided via a dedicated e-learning website. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Formative evaluation consisted of:  1.Non-compulsory intermediate tests (2 to 3 in total) focused on solving problems (30% of final mark) 2. Final written exams that includes: a. Theoretical questions of knowledge and critical thinking and b .Solving of problems-exercises (70% of final mark) |

**ATTACHED BIBLIOGRAPHY**

Ghaliand, A. and Neville, A.M.(1989), Structural Analysis, a unified classical and and Matrix Approach, Chapman and Hall.  
Hibbeler R.C. (2002), Structural Analysis, Prentice Hall.  
W.Wagner and G. Erlhog (2012), Applied Statics, ΚΛΕΙΔΑΡΙΘΜΟΣ publication (Greek translation from German).

### Reinforced Concrete II

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ013 | **SEMESTER** | | 5th | |
| **COURSE TITLE** | Reinforced Concrete II | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=773 | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: 1. Calculate loads and element forces in reinforced concrete slabs and transfer loads from slabs to beams. 2. Recognize the types of slabs and dimension one-way or two-way supported slabs according to Eurocode 2. 3. Dimension linear elements of reinforced concrete in torsion according to Eurocode 2. 4. Model reinforced concrete frame structures using finite element analysis software for appropriate combinations of loads in ultimate and serviceability limit states and calculate the envelopes of element forces 5. Draw the construction plan with the developments and reinforcement details of the reinforced concrete elements. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Reinforced concrete slabs. Types of slabs and design of simply and cross-reinforced slabs.  • Load-balancing method. Resolution of slabs using the Czerny tables.  • Strip method. Resolution of slabs using the Markus tables.  • Design in torsion.  • Load combinations for gravity and seismic actions. Alternating loads and stress envelopes.  • Dimensioning of linear reinforced concrete elements (beams/columns) for gravity and seismic actions.  • Simulation of a reinforced concrete frame in a finite element program. Calculation of stress envelopes. Dimensioning.  • Construction plan. Reinforcement details. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 20 | | Individual study | 58 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught (30%). 2. Final written exam (in Greek) at the end of the semester (70%). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Penelis G., Stylianidis K., Kappos A., Ignatakis Ch., Design of Reinforced Concrete Structures According to the New Concrete and Seismic Codes, AUTh publ., 1995 (in Greek)  
Tsonos A.D., Design of Reinforced Concrete Structures according to the Eurocodes, Sofia publ., 2016 (in Greek)  
Georgopoulos Th., Reinforced Concrete vol. I, Georgopoulos publ., 2015 (in Greek)  
Georgopoulos Th., Reinforced Concrete vol. II, Georgopoulos publ., 2015 (in Greek)  
Zararis P., Reinforced Concrete Calculation Methods, Kyriakidis publ., 2002 (in Greek)

### Soil mechanics ΙI

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ003 | **SEMESTER** | | 5th | |
| **COURSE TITLE** | Soil mechanics ΙI | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=428 | | | | |

**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 aim of the course is to help the student understand the basic principles of Soil Mechanics, to consolidate knowledge regarding the behavior of the “soil” as a civil engineering material and to develop the ability to computationally address basic problems in classic applications of Soil Mechanics. Upon successful completion of the course, the student will be able to:  • Recognize and understand the basic characteristics of the behavior of different types of soils.  • Distinguish and comprehend the parameters related to the bearing capacity of the soil and to the developing settlements in the soil.  • Calculate the bearing capacity of the soil as well as the developing settlements in the case of surface foundations.  • Calculate the horizontal soil stresses and earth pressures.  • Combine the individual soil properties and characteristics and be able to differentiate and adapt estimation and computation procedures based on the particular parameters of each examined case study.  • Synthesize solutions based on the theories that have been taught, evaluating the requirements of the problem at hand, being able to support the proposed solutions, and compare by choosing the most appropriate among different approaches. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: • Search, analysis and synthesis of data and information • Decision-making • Working independently • Project planning • Self awareness excercise | |

**SYLLABUS**

|  |
| --- |
| Examination of soil behavior as a material involved in Civil Engineering constructions with the aim of solving problems related to soil bearing capacity, developing settlements as well as lateral earth pressures. Content of theory lectures and practical exercises:  • Influence of external loads on developing soil stresses.  • Bearing capacity of soil in shallow foundations.  • Settlements of granular and cohesive soils, soil consolidation.  • Behavior of soils under drained and undrained conditions.  • Earth pressures and retaining structures.  • Introduction to the current regulatory framework (Eurocode 7). |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required.  Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Short answer and Multiple Choice Theoretical Questions (Formative and/or Inferential) • Solving problems-exercises  Written assignments and oral examination including: • Solving problems-exercises • Assessment of knowledge on basic subjects of the course |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Γεωργιάδης Κ., Γεωργιάδης Μ. (2009), "Στοιχεία Εδαφομηχανικής", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-157-5  
• [In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0  
• [In Greek] Καββαδάς Μ. (2016), "Στοιχεία Εδαφομηχανικής (2η έκδοση)", Εκδόσεις Τσότρας, ISBN: 978-618-5066-62-8  
• Das B.M. (2019), "Advanced Soil Mechanics", Taylor and Francis (5th edition), New York.  
• Verruijt A. (2018), "An Introduction to Soil Mechanics", Springer  
• [In Greek] Budhu Μ. (2020), "Εδαφομηχανική και Θεμελιώσεις", Εκδόσεις Gotsis, Πάτρα, ISBN: 978- 960-9427-90-6

### Steel Structures I

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ016 | **SEMESTER** | | 6th | |
| **COURSE TITLE** | Steel Structures I | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=863 | | | | |

**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* | |
| Upon the successful completion of the course the students are anticipated to:  - Understand the load resisting mechanisms in typical steel structures;  - Understand and analyse the mechanical behaviour of beam-type steel members;  - Identify possible failure mechanisms;  - Check and design steel members according to the Eurocode 3 provisions. | |
| **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*  *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…*  *…….* |
| - Search, analysis and synthesis of information and data using the appropriate technology  - Decision making  - Student individual project  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Structural steel: mechanical properties and typical structural applications. Structural analysis and Eurocode 3 provisions for the design of steel structures. Load combinations. Ultimate and serviceability limit states. Local buckling and cross-section classification. Resistance of steel cross-sections and steel members under tension, compression, bending, shear and combined action effects. Buckling resistance of steel members. Flexural and lateral-torsional buckling. Structural layouts and load resisting mechanisms of typical steel structures. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 42 | | Individual study | 62 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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.* | Formative evaluation consisting of:  - Non-compulsory homework exercises focusing on problem solving  - Final written exams comprising problem-solving questions |

**ATTACHED BIBLIOGRAPHY**

- Vayas, I., Ermopoulos, J., Ioannidis, G. 2005. Design of steel structures – According to the final version of Eurocodes. Publisher: Κλειδάριθμος, ISBN: 978-960-461-582-7 (in Greek)  
- Baniotopoulos, C.K. 2009. Steel structures – Design principles according to Eurocode 3. Publisher: Ζήτη, ISBN: 978-960-456-184-1 (in Greek)  
- Baniotopoulos, C.K. Nikolaidis, T.N. 2012. Steel structures, Design examples according to Eurocode 3. Publisher: Ζήτη, ISBN: 978-960-456-323-4 (in Greek)  
- Aldinger, E., Baumann, G., Ignatowitz, E. 1995. Steel Structures. Publisher: Ευρωπαϊκές Τεχνολογικές Εκδόσεις, ISBN: 9789603310358 (in Greek)  
- Lammlin, G., 2010. Metal structures. Publisher: ΙΩΝ, ΙSBN: 978-960-331-469-1 (in Greek)  
- Pavlou, G. D. Steel structures, 2014. Publisher: ΙΩΝ, ISBN: 978-960-508-136-2 (in Greek)  
- Giannopoulos A.C. Metal structures, 2005. Publisher: Gotsis, ISBN:9789604115259 (in Greek)

### Foundations Retaining Walls

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ004 | **SEMESTER** | | 6th | |
| **COURSE TITLE** | Foundations Retaining Walls | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=711 | | | | |

**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 aim of the course is to help the student understand the theoretical principles in the subjects of Foundations and Retaining Structures and the ability to computationally address basic problems in classic applications of Foundations. Upon successful completion of the course, the student will be able to:  • Recognize, understand and evaluate the basic physical and mechanical parameters of soil and construction related to the study and analysis of foundations and retaining walls.  • Distinguish and understand the different foundation cases, as well as the type and behavior of retaining structures.  • Study a single shallow foundation by investigating in detail, based on the existing regulatory framework, the required failure checks in bearing capacity, settlements, overturning, sliding, uplift, bending, shearing and punching. Also, calculate the required reinforcement (foundation detailing).  • Estimate the developing forces and design the foundation tie-beams.  • Calculate bearing capacity of piles and pile settlement.  • Calculate the earth pressures and design a retaining wall.  • Synthesize solutions based on the course contents, evaluating the requirements of the problem at hand, support the proposed solutions and compare and choose the most suitable between different approaches. | |
| **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*  *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…*  *…….* |
| • Search, analysis and synthesis of information and data  • Decision making   • Working independently   • Project planning | |

**SYLLABUS**

|  |
| --- |
| Study, analysis and design of various types of foundations (reinforced concrete shallow and deep foundations) and retaining walls. It includes the computation of internal forces, the calculation of the loading at foundation level and the required procedure to determine the reinforcement and configuration of the examined structural elements based on the current code regulations.    Content of theory lectures and practical exercises:  • Relation to Soil Mechanics (soil characteristics, soil stresses, soil bearing capacity and settlements, based on literature formulas and code regulations).  • Study of shallow foundations and theoretical application in the design of surface footings. Detailed application to individual footings including the description of design rules, footing stability checks (overturning, sliding, uplift), foundation soil bearing capacity and settlement checks, and design of concrete footings (in bending, shearing, punching) including calculation of required reinforcement.  • Study and design of foundation tie-beams.  • Study of bearing capacity and settlement of pile foundations (individual piles and pile group).  • Study and design of reinforced concrete retaining walls. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises Written assignments (submitted in stages) and oral examination including: • Processing and solving exercises-problems of foundations and retaining walls • Assessment of understanding of key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Αναγνωστόπουλος Χ., Χατζηγώγος Θ., Αναστασιάδης Α., Πιτιλάκης Δ. (2012), "Θεμελιώσεις- Αντιστηρίξεις και Γεωτεχνικά Έργα", Εκδόσεις Αϊβάζης, Θεσσαλονίκη, ISBN: 978-960-549- 000-3  
• [In Greek] Γεωργιάδης Κ., Γεωργιάδης Μ. (2009), "Στοιχεία Εδαφομηχανικής", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-157-5  
• [In Greek] Αναγνωστόπουλος Α., Παπαδόπουλος Β., (2019), "Σχεδιασμός των Θεμελιώσεων", Εκδόσεις Συμεών, ISBN: 978-960-9400-50-3  
• [In Greek] Κωμοδρόμος Α.Μ. (2019),"Θεμελιώσεις, Αντιστηρίξεις: οριακή ισορροπία – αριθμητικές μέθοδοι (2η έκδοση)", Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-952-8  
• [In Greek] Αναγνωστόπουλος Α., Καββαδάς Μ., Παπαδόπουλος Β. (2009), "Σημειώσεις για τον Ευρωκώδικα 7 (EN 1997)", Τεχνικό Επιμελητήριο Ελλάδος, Αθήνα  
• [In Greek] Καββαδάς Μ. (2005), "Σημειώσεις Θεμελιώσεων Τεχνικών Έργων", Ε.Μ. Πολυτεχνείο, Πανεπιστημιακές Εκδόσεις  
• [In Greek] Γραμματικόπουλος Γ., Μάνου-Ανδρεάδου Ν., Χατζηγώγος Θ. (2015), "Εδαφομηχανική: ασκήσεις και προβλήματα (2η έκδοση)", Αφοι Κυριακίδη, Θεσσαλονίκη, ISBN: 978-618- 5105-87-7  
• [In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0  
• [In Greek] Κωστόπουλος Σ.Δ. (2008), "Γεωτεχνικές Κατασκευές Ι (2η έκδοση)", Εκδόσεις Ίων, ISBN: 960- 411-563-4  
• [In Greek] Bowles J.E. (2009), "Θεμελιώσεις: Τόμος Ι", Εκδόσεις Φούντας, Αθήνα, ISBN:978960330665-8  
• [In Greek] Πενέλης Γ., Στυλιανίδης Κ., Κάππος Α., Ιγνατάκης Χ. (2008), "Κατασκευές από Οπλισμένο Σκυρόδεμα σύμφωνα με τους Νέους Κανονισμούς Ο/Σ (2η έκδοση)", Εκδόσεις Αϊβάζης, Θεσσαλονίκη, ISBN: 978-960-86090-9-9

### Highway Engineering IΙ

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ005 | **SEMESTER** | | 6th | |
| **COURSE TITLE** | Highway Engineering IΙ | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=744 | | | | |

**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* | |
| Upon completing this course students should be able to recognize the construction procedure of road projects, earthworks calculation, road drainage, construction procedures of flexible pavements, rigid pavements, pavement maintenance and rehabilitation, and pavement management and recycling. | |
| **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*  *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…*  *…….* |
| -Search for, analysis and synthesis of data and information, with the use of the necessary technology  -Adapting to new situations  -Decision-making  -Project planning and management  \_Respect for the natural environment | |

**SYLLABUS**

|  |
| --- |
| Road construction, earthworks and engineering projects, geological and geotechnical investigation of road design, soils: origin and physical properties, construction equipment and execution of earthworks, cuttings, embankments, geosynthtetic materials in road engineering, landslides and slope stability, cut and cover method, reinforced embankments, road drainage works, culverts, environmental impacts of road construction, road earthworks, earthworks management, flexible pavement layers, flexible pavements design methods, rigid pavements, pavement maintenance and rehabilitation, pavement management, pavement recycling. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 52 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises) The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Αποστολέρης, Α.Κ. (2015). Οδοποιία Ι – Χαράξεις και Υπολογισμός Χωματισμός, Θεωρία και Πρακτική. Αναστάσιος Κ. Αποστολέρης, ΑΠΟΣΤΟΛΕΡΗΣ ΚΑΙ ΣΙΑ Ο.Ε., ISBN: 9789609371735.  
• [In Greek] Μουρατίδης, Α.Κ. (2007). Οδοποιία, Η κατασκευή των οδικών έργων. University Studio Press, ISBN: 978-960-12-1399-6.  
• [In Greek] Νικολαΐδης, Αθ. Φ. (2019). Οδοποιία: Οδοστρώματα - Υλικά - Έλεγχος Ποιότητας. ΙΚΑΝΙΚ Ι.Κ.Ε., ISBN: 978-618-84166-0-4.  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 2: Διατομές (ΟΜΟΕ-Δ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 3: Χαράξεις (ΟΜΟΕ-Χ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.  
• [In Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 8: Αποχέτευση - Στράγγιση - Υδραυλικά Έργα Οδών (ΟΜΟΕ-ΑΣΥΕΟ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 2/11/2002.

### Dynamics of Structures I

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ015 | **SEMESTER** | | 6th | |
| **COURSE TITLE** | Dynamics of Structures I | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/ | | | | |

**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* | |
| Understand how structures respond to dynamic loads. Evaluate the critical parameters that affect the structural dynamic response. Construct and solve (analytically and/or computationally) the equation of motions for sdof and mdof systems. Interpret and use earthquake response and design spectra. | |
| **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*  *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…*  *…….* |
| -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 interdisciplinary environment  -Project planning and management  -Criticism and self-criticism  -Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Differences between static and dynamic response of structures. Dynamic loads. Degrees of freedom. Formulation of equation of motion. Systems with one degree of freedom (sdof): Free undamped and damped vibrations. Forced vibrations under harmonic and impulsive forces. Forced undamped and damped vibrations for any external load. Duhamel integral.  Response under ground motion. Numerical calculation of dynamic response.Response spectra. Systems with many degrees of freedom (mdof): Formulation of mass and stiffness matrices. Free vibration. Eigenfrequencieses and modeal shapes. Orthogonality properties. Forced vibations. Generalized mass, stiffness, external force. Decoupling techniques for the evaluation of dynamic response. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Communication via e-mail and Zoom platform. Additional material is provided via a dedicated e-learning website. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Formative evaluation consisted of:  1.Non-compulsory intermediate tests (2 to 3 in total) focused on solving problems (30% of final mark) 2. Final written exams that includes: a. Theoretical questions of knowledge and critical thinking and b .Solving of problems-exercises (70% of final mark) |

**ATTACHED BIBLIOGRAPHY**

A.Chopra (2016), Dynamics of Structures, Prentice-hall International Series

### Project Management and Construction Site Management

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ006 | **SEMESTER** | | 6th | |
| **COURSE TITLE** | Project Management and Construction Site Management | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to cite methods of economic investment evaluation, layout the organizational structure of a project, prepare project safety plans, analyze, describe and graphically depict the project’s organizational structure and provide cost estimates (takeoffs) as well as activity duration estimates and finally create project time schedules as well as risk management plans. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: - Search for, analysis and synthesis of data and information, with the use of the necessary technology  - Project planning and management  - Decision-making | |

**SYLLABUS**

|  |
| --- |
| Introduction to project management. Methods of project management and control. Methods of network analysis. Production resource scheduling. Cost estimation of projects and financial planning. Project control. Quality management. Health and safety management in projects. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, E-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 39 | | Practice/exercises | 13 | | Project(s) | 52 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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 (100%)  or Final written examination (70%) optional assignement (30%). |

**ATTACHED BIBLIOGRAPHY**

[In Greek]. Πολύζος, Σ. (2004) Διοίκηση Διαχείριση των Έργων - Μέθοδοι και Τεχνικές, Κριτική, ISBN:
  
960-218-379-9.
  
[In Greek]. Παναγιωτακόπουλος, Δ. (2008) «Εισαγωγή στο Χρονικό Προγραμματισμό των
  
Κατασκευών», Ζυγός, Θεσσαλονικη
  
[In Greek]. Δημητριάδης, Αντώνης. 2004. Διοίκηση, διαχείριση έργου – Project management. 3η
  
έκδοση. Αθήνα: Εκδόσεις Νέων Τεχνολογιών.

### Underground Hydraulic and Hydrology

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ005 | **SEMESTER** | | 6th | |
| **COURSE TITLE** | Underground Hydraulic and Hydrology | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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 successful completion of the course will enable students to: - Clarify the laws of hydraulics linked with the saturated water flow in the ground; - Interpret the hydrological cycle and natural hydrological processes; - Define the spatial and temporal rainfall distribution at catchments’ scale; - Analyze groundwater flows towards ditches and wells from confined and unconfined aquifers; - Apply approximate solutions for flow in saturated porous medium; - Evaluate the required technical works required for hydrological studies’ development. | |
| **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*  *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…*  *…….* |
| -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 interdisciplinary environment  -Project planning and management  -Criticism and self-criticism  -Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| - Basic properties and classification of aquifers and hydraulic parameters. Soil characteristics. Darcy's law. Coefficient of permeability - Continuity equation. The mathematical model of groundwater flows. Types of boundaries and boundary conditions - Confined and free surface flows towards ditches and wells - Systems of wells. Method of images. Seepage force and the effect of piping  - Hydrologic cycle, hydrological processes and water balances - Spatial and temporal rainfall distribution at catchments’ scale - Measurements and analysis of rainfall and stream discharges - Prevision of floods and droughts. Simulation of watersheds - Estimation of hydrologic data for engineering works |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Educational visit |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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.* | Formative evaluation consisted of:  - Non-compulsory intermediate essays (5 to 6 in total) (30% of final mark) focused on solving problems : - Final written exams (70% of final mark) consisted of: a) multiple choice and short answer questions on the basic theory of the course (10% of the final mark)  b) Solving of problems/questions (60% of the final mark) |

**ATTACHED BIBLIOGRAPHY**

- Κουτσογιάννης Δημήτριος, Ξανθόπουλος Θεμιστοκλής, Τεχνική Υδρολογία, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", ISBN: 978-960-603-506-7. Κωδικός Βιβλίου στον Εύδοξο: 59390290  
- Τολίκας Δημήτρης Κ., Υπόγεια υδραυλική, Εκδόσεις Επίκεντρο, 2005 (1η έκδοση), ISBN: 978-960-88731-7-9. Κωδικός Βιβλίου στον Εύδοξο: 15196  
- Λατινόπουλος Περικλής, ΥΔΡΑΥΛΙΚΗ ΤΩΝ ΥΠΟΓΕΙΩΝ ΡΟΩΝ, Εκδόσεις ΧΑΡΙΣ ΕΠΕ, 2006 (1η έκδοση), ISBN: 978-960-98154-5-1. Κωδικός Βιβλίου στον Εύδοξο: 6861  
- Τσακίρης Γ., Υδατικοί πόροι : I Τεχνική υδρολογία και διαχείρηση των υδατικών πόρων, Εκδόσεις ΣΥΜΜΕΤΡΙΑ, 2012 (1η έκδοση), ISBN: 978-960-266-380-6 Κωδικός Βιβλίου στον Εύδοξο: 22771790  
- Τσακίρης Γ., Υδατικοί Πόροι ΙΙ: Εφαρμογές Τεχνικής Υδρολογίας, Εκδόσεις Συμμετρία, 2009 (1η έκδοση), ISBN: 978-960-266-266-3 Κωδικός Βιβλίου στον Εύδοξο: 45490  
- Μπαλτάς Ευάγγελος, Μιμίκου Μαρία, Τεχνική Υδρολογία, Εκδόσεις Παπασωτηρίου, 2018 (6η έκδοση), ISBN: 978-960-491-125-7. Κωδικός Βιβλίου στον Εύδοξο: 77117411  
- Μυρωνίδης Δημήτριος, Υδρολογία και Υδραυλική, Εκδόσεις ΤΖΙΟΛΑ, 2021 (1η έκδοση), ISBN: 978-960-418-884-0. Κωδικός Βιβλίου στον Εύδοξο: 94688988

### Water Supply and Sewerage Systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ004 | **SEMESTER** | | 6th | |
| **COURSE TITLE** | Water Supply and Sewerage Systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of this course, students will be able to: • identify and describe qualitative and quantitative water and sewerage (wastewater and stormwater) data • explain and estimate the required water supply and sewerage infrastructure in horizontal and vertical sections • examine the design of typical water supply projects (external aqueducts, reservoirs, distribution networks) • design sewage and stormwater drainage networks in an urban environment • asses hydraulic network analysis models on the computer • identify water supply and sewerage works in the relevant studies (technical report, general works layout, pipeline sections, materials, geometric features). | |
| **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*  *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…*  *…….* |
| • Search, analysis and synthesis of data and information • Adapting to new situations  • Decision making • Individual work • Working in an interdisciplinary environment • Project design and management • Criticism • Promoting free, creative and inductive thinking | |

**SYLLABUS**

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| --- |
| 1. Short course description:  The course aims to provide students with the basic theoretical and background knowledge for the core course 'YDR004 Water Supply and Sewerage Systems’. It includes the necessary material for the understanding of the basic concepts of design and dimensioning of all individual water supply and sewerage network projects in urban and semi-urban areas through a theoretical and practical (application exercises) approach.  2. Lectures’ content: o Introduction to urban hydraulic works, historical background. Basic principles and design parameters of water supply projects. o Qualitative and quantitative water quality and quantity data. Sampling of springs, surface and groundwater. o Pumping stations and pressure mains. Calculation of water needs. o Siting, sizing, and design of water reservoirs and yield/reduction wells. Required elevation and sizing. o Design, hydraulic analysis and sizing of distribution networks. Calculation of radial and axial networks. o Computer models for solving water supply networks. o Qualitative and quantitative data of municipal/ industrial wastewater and stormwater. o Hydraulics of sewers. o Basic principles and design parameters of urban sewerage projects. Types of drainage and stormwater networks. o Principles of sewage network design. Flow speed limits. Minimum gradients. Couplings. Local losses. High and low velocity problems. Qualitative and technological aspects of sewerage pipelines. o Estimation of stormwater flows. Design principles for rainwater collection networks. Methodology for the design and calculation of rainwater networks in horizontal and vertical sections. Construction and hydrological constraints. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Support of the learning process (Teaching and Communication with students) through PowerPoint lectures, through the course website, through the 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 page. Teacher-student collaboration time either by physical presence or by teleconference. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Educational visit |  | | Individual study | 50 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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.* | Language of Evaluation: Greek. Written test with extended answer questions (formative and/or inferential). Theory assessment (100% of the final grade): • A written progress examination (30% of the final grade) including: \_Theoretical Extended Response Questions (formative and/or inferential) \_Problem-solving exercises. • Written final examination (70% of the final grade) including: \_Theoretical extended response questions (formative and/or inferential \_Problem-solving exercises. The present course description with the assessment criteria is accessible to students in the Departmental study guide (Departmental website) and on the course website. The outline is communicated orally to students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Πρίνος Παναγιώτης, 2013, Υδραυλική Κλειστών και Ανοικτών Αγωγών, Εκδόσεις Ζήτη, ISBN: 978-960-456-344-9. Κωδικός στον Εύδοξο: 2276797.  
• [In Greek] Τσακίρης Γεώργιος, 2010, Υδραυλικά Έργα, Σχεδιασμός και Διαχείριση, Τόμος Ι: Αστικά Υδραυλικά Έργα, Εκδόσεις Συμμετρία, ISBN: 978-960-266-289-2. Κωδικός στον Εύδοξο: 45485.  
• [In Greek] Λαγγούσης Ανδρέας, Φουρνιώτης Νικόλαος, 2020, ΣΤΟΙΧΕΙΑ ΣΧΕΔΙΑΣΜΟΥ ΕΡΓΩΝ ΥΔΡΕΥΣΗΣ ΚΑΙ ΑΠΟΧΕΤΕΥΣΗΣ, Εκδόσεις GOTSIS, ISBN: 9789609427890. Κωδικός στον Εύδοξο: 94702516.  
• [In Greek] Δημητρακόπουλος Αλέξανδρος, 2008, Σχεδιασμός Υδραυλικών Έργων, Εκδόσεις Φ. ΦΩΤΟΠΟΥΛΟΣ - Α. ΧΑΡΑΛΑΜΠΑΚΗΣ Ο.Ε., ISBN: 978-960-88473-1-6. Κωδικός στον Εύδοξο: 456.  
• [In Greek] Στάμου Αναστάσιος, 2016 (3η έκδ.), Εφαρμοσμένη Υδραυλική, Εκδόσεις Παπασωτηρίου, ISBN: 978-960-491-109-7. Κωδικός στον Εύδοξο: 59397206.

### Steel Structures II

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ017 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Steel Structures II | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 4 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=945 | | | | |

**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* | |
| Upon the successful completion of the course the students are anticipated to: - Understand, analyse and evaluate the mechanical behaviour of typical steel connections; - Identify the possible failure mechanisms of typical steel connections; - Analyse, evaluate and design typical connections in steel structures; - Understand and evaluate the seismic actions that are imposed in steel structures; - Develop the structural system of typical steel structures (including their connections) for resisting static and seismic actions; - Understand the consequences of accidental or unexpected actions in steel structures; - Select appropriate surface protection measures for steel structures. | |
| **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*  *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…*  *…….* |
| - Search, analysis and synthesis of information and data using the appropriate technology  - Decision making  - Student individual project  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Steel connections with mechanical fasteners (bolts, pins, rivets) and welds. Joints in truss and frame structures (classification, modelling and analysis methods). Design of steel connections in accordance with the provisions of Eurocode 3. Shear and tension connections. Design of steel structures against seismic actions according to the provisions of Eurocode 8. Construction aspects of steel structures. Class 4 cross-sections. Design against corrosion and fire. Overhead crane runway beams. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 42 | | Individual study | 62 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***104*** | |
| **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.* | Formative evaluation consisting of:  - Non-compulsory homework exercises focusing on problem solving  - Final written exams comprising problem-solving questions |

**ATTACHED BIBLIOGRAPHY**

- Sofianopoulos S.D. 2006. Elements in metal structures. Publisher: Παπασωτηρίου, ISBN: 9789607530745 (in Greek)  
 - Baniotopoulos, C.K. 2003. Connections of metal structures. Publisher: Ζήτη, ISBN: 9789604318926 (in Greek)

### Matrix Structural Analysis

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ004 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Matrix Structural Analysis | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Understand the Direct Robustness (Stiffness) Method. Apply the method for the analysis of plane trusses and frames. Apply the method for the analysis of 3D structures. | |
| **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*  *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…*  *…….* |
| -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 interdisciplinary environment  -Project planning and management  -Criticism and self-criticism  -Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Overview of matrix structural analysis and design. Primary structural members and their modeling.  Global and local systems of axes. Global and local systems of axes. Vectors of end-actions and end-translations of a plane truss and a plane frame element. Transformation matrix.  Calculation of local-global stiffness matrix of a plane truss and a plane frame element. Analytical and numerical (shape function, deformation matrix) methods. Vectors of nodal-forces and nodal-translations, global stiffness matrix of a plane truss and a plane frame. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Communication via e-mail and Zoom platform. Additional material is provided via a dedicated e-learning website. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Formative evaluation consisted of:  1.Non-compulsory intermediate tests (2 to 3 in total) focused on solving problems (30% of final mark) 2. Final written exams that includes: a. Theoretical questions of knowledge and critical thinking and b .Solving of problems-exercises (70% of final mark) |

**ATTACHED BIBLIOGRAPHY**

M.Papadrakakis and E.Sapountzakis (2018), Matrix Methods for Advanced Structural Analysis, Elsevier Inc.

### Plates Shells – Special issues in Finite Element Analysis

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ020 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Plates Shells – Special issues in Finite Element Analysis | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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 aims to understand the behavior of plates - shells - disks using analytical and approximate methods and the application of the finite element method to planar structures. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Introduction to the mathematical theory of elasticity. The differential equation of the disc in Cartesian and polar coordinates.   Thin plates. The differential equation of plates. Analytical and approximate solutions. Orthogonal - circular plates.   Introduction to the Finite Element Method. Finite elements of plates (Kirchhoff). Finite elements of plates (Mindlin).   Shells. Loads, physical quantities and equations of shell theory. Shell membrane theory. Shell bending theory.   Modelling of planar structures. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Sapountzakis E., Plates Theory, NTUA publ., 2005 (in Greek)  
Valiasis Th., Planar structural systems, Zitis publ., 2000 (in Greek)  
Makarios Tr. Planar structural systems, Tziolas publ., 2018 (in Greek)  
J. Katsikadelis, The Boundary Element Method For Plate Analysis, 2014, Academic press, Elsevier  
Tsamasfyros G., Theotokoglou E., Finite Element Method vol. I, Symmetry publ., 2005 (in Greek)  
Provatidis Ch., Finite Elements in the Analysis of Structures, Tziolas publ., 2016 (in Greek)

### Dynamics of Structures II

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ021 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Dynamics of Structures II | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr | | | | |

**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* | |
| Determine the dynamic behaviour of complex structural systems (in both time and frequency domains). Understand, model and compute the nonlinear dynamic response of structures exposed to various environmental loads Clarify and evaluate the effect of randomness of environmental loads. | |
| **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*  *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…*  *…….* |
| -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 interdisciplinary environment  -Project planning and management  -Criticism and self-criticism  -Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Generalized sdof systems. Static condensation and Static correction metods. Rayleigh-Ritz methods.  Non-classically damped systems. Dynamics of inelastic structure. Earhquake response of base-isolated buildings. Frequency-domain method of elastic response analysis. Introduction to random vibration. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Communication via e-mail and Zoom platform. Additional material is provided via a dedicated e-learning website. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | The evaluation of the students is composed of marks collected from different parts of the teaching process, as follows: 1. Individual projects (2-3) during the semester (30% of the final grade) 2. Final written exams (70% of final grade) |

**ATTACHED BIBLIOGRAPHY**

A.Chopra (2016), Dynamics of Structures, Prentice-hall International Series

### Building Construction ΙΙ

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ022 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Building Construction ΙΙ | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr | | | | |

**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* | |
| Upon completing this course students should be able to address unique constructional issues and propose solutions for them. They should be able to choose appropriate materials from the available industry and substantiate their choice. They should be able to navigate through a wide range of sources to formulate their proposal, produce the respective constructional drawings and provide for technical specifications, maintaining references to the building’s drawings. Finally, they should be able to organize constructional information for the building’s construction specifications. | |
| **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*  *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…*  *…….* |
| -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 -Project planning and management  -Respect for the natural environment -Criticism and self-criticism  -Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| This course aims to train students to provide solutions for advanced constructional issues in a building. Special issues in thermal insulation, water protection, acoustic protection, fire-resistance, staircase detailing, special flooring, structural glazing, wall cladding are presented and analyzed. Students learn to use a variety of sources to propose solutions, materials and building specifications. Starting from smaller exercises, they work on a project throughout the semester where all these issues are implemented. Courses are enhanced by visits to construction sites and buildings, where students are also handed out related assignments. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 25 | | Practice/exercises | 25 | | Individual study | 30 | | Project(s) | 20 | | Project(s) | 30 | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 (50%) Compulsory assignment/project (50%) |

**ATTACHED BIBLIOGRAPHY**

-[In Greek]. Αθανασόπουλος Χ., ‘’Κατασκευή κτιρίων: Σύνθεση και Τεχνολογία’’, Αθήνα 1991
  
-[In Greek]. Ζαχαριάδης Α., ‘’Οικοδομική Τεχνολογία’’ University Studio Press, Θεσσαλονίκη, 2004.
  
-[In Greek]. Καλογεράς Ν., Κιρπότιν Χ., Μακρής Γ., Παπαϊωάννου Ι., Ραυτόπουλος Σ., Τζίτζας Μ.,
  
-[In Greek]. Τουλιάτος Π. ‘’Θέματα Οικοδομικής’’, Ε.Μ.Π., εκδόσεις Συμμετρία, Αθήνα, 1999.
  
-[In Greek]. Τσινίκας Ν., ‘’Αρχιτεκτονική Τεχνολογία’’ εκδ. University Studio Press, Θεσσαλονίκη 1993
  
-[In Greek]. Παπαϊωάννου,Κ., Τεχνολογία της Τοιχοποιίας, University Studio Press, Θεσσαλονίκη 1998
  
-[In Greek]. Πρεφτίτση, Φ. Γ., «Μεταλλικά κτίρια: είδη μετάλλων, σχεδιασμός, κατασκευή, προστασία,
  
ανακαίνιση», Θεσσαλονίκη : Κτίριο - Επιλογή στη Δόμηση Ε.Π.Ε., 2006.
  
-[In Greek]. Schmitt Η., Heene Α. ‘’Κτιριακές κατασκευές : τα δομικά στοιχεία και η συναρμογή τους :
  
βασικές αρχές της σύγχρονης δόμησης’’ μετάφραση Δ. Μαλασπίνας, εκδ. Μ. Γκιούρδας ,
  
Αθήνα 1994.
  
-[In Greek]. Ching, F., Building Construction Illlustrated , Wiley, 5th edition, 2014
  
-[In Greek]. Schittich, C. Glass Construction Manual, Birkhäuser Architecture; 2nd, revised and expanded
  
ed. Edition, 2007

### Design and Retrofitting of Masonry Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ019 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Design and Retrofitting of Masonry Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: 1. Know the properties of the individual materials (stone blocks and mortar) that make up the load-bearing masonry as well as the mechanical behavior of the composite material 2. Understand the structural system of load-bearing masonry structures and the element forces that develop in it 3. Apply the regulatory provisions of the current codes (Eurocodes 6 and 8) for the design of masonry structures 4. Recognize the typical forms of failure in structural elements and buildings from masonry and to propose/apply appropriate intervention techniques | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • The individual materials of load-bearing masonry. Types of bricks and mortars  • The mechanics of load-bearing masonry. Resistance to compression, tension, bending, and shear according to Eurocode 6  • Stress state at the ultimate limit state for gravity loads and seismic actions according to Eurocode 8  • Response of masonry structures to in-plane and out-of-plane loading  • Pathology of masonry buildings. Typical forms of failure  • Materials and intervention techniques (repairs-strengthening) in existing masonry constructions |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 20 | | Individual study | 58 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught (30%). 2. Final written exam (in Greek) at the end of the semester (70%). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Karantoni F., Masonry Structures, Design and Repairs, Papasotiriou publ., 2012 (in Greek)  
Spyrakos K., Assessment and Repairs for Seismic Loads, Ergonomos publ., 2019 (in Greek)  
Tasios Th., Masonry Mechanics, Symmetry publ., 1992 (in Greek)  
Tomaseciv M, Seismic Design of Masonry Buildings, Kleidarithmos publ., 2004 (in Greek)  
Stylianidis K Ignatakis Ch. Masonry Structures (according to Eurocodes 6 8), AUTh publ., 2010 (in Greek)

### Engineering Seismology and Earthquake Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ005 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Engineering Seismology and Earthquake Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completion of the course, the students will be able to:  • be familiar with the basic rules of technical seismology, rupture processes of seismically active faults and the propagation of seismic ground motion • be familiar with the basic provisions of Eurocode 8 that are related to the seismic design philosophy  • assess the expected seismic hazard in an area. • make a basic analysis and interpretation of the seismic signal | |
| **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*  *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…*  *…….* |
| • Decision making  • Design and management of assignments  • student individual project • Search, analysis and synthesis of information and data using the appropriate technology | |

**SYLLABUS**

|  |
| --- |
| • Technical seismology, seismicity, ground motion prediction equations. Seismic risk and seismic hazard.  • Ground motion. Characteristics, forms, dependent factors. Duration of seismic motion and influential factors. • Near-field earthquakes. Effect of vertical component.  • Prediction of seismic motion. Seismic codes. Probabilistic analysis of seismic hazard. Seismic scenarios. Response spectra.  • Influence of site effects on the seismic response, soil liquefaction. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Individual project aiming at better understanding the teaching concepts  2. Final written exam at the end of the semester (in Greek language) |

**ATTACHED BIBLIOGRAPHY**

• [in Greek] Πιτιλάκης Κυριαζής: «Γεωτεχνική σεισμική μηχανική» Έκδοση: 1η έκδ./2010, ISBN: 978-960-456-226-8, Εκδότης: Ζήτη Πελαγία Σια Ι.Κ.Ε.  
• [in Greek] Καρακαΐσης Γεώργιος, Παπαζάχος Βασίλης, Χατζηδημητρίου Παναγιώτης, «Εισαγωγή στη Σεισμολογία», Εκδόσεις Ζήτη, 2005, ISBN: 960-431-979-5  
• Sucuoğlu, Halûk, Akkar, Sinan: “Basic Earthquake Engineering”, Springer, 2014, ISBN-10 : 3319010255  
• Roberto Villaverde, “Fundamental Concepts of Earthquake Engineering”, CRC Press, 2009, ISBN-10 : 1420064959

### Rock Mechanics and Tunnels

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ006 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Rock Mechanics and Tunnels | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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 aim of the course is the student to be able to realize and assess the basic characteristics of geological (rock) and soil formations in relation to the design and construction of tunnels and underground structures.  Upon completion of the course, the student will be able to:  • to recognize, understand and assess the basic parameters of rock and soil formations and evaluate the parameters of their mechanical behavior • to distinguish and select among the different approaches regarding the design and construction methods of underground structures. • to assess and evaluate the level of safety due to the various risks of failure of a tunnel | |
| **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*  *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…*  *…….* |
| The course contributes to the acquirement of the following capabilities: • Search, analysis and synthesis of information and data using the appropriate technology  • Decision making  • Student individual project • Design of structures • Respect of the physical environment | |

**SYLLABUS**

|  |
| --- |
| Design and analysis of tunnels and underground structures in a preliminary level. Excavation and support of underground structures and structural configuration based on the current code requirements.  Contents of the theory lectures and application exercises:  • Introduction to the subject of underground structures and their importance- Type of tunnels and different construction methods  • Geological and geotechnical parameters that are related to the underground structures  • Physical characteristics, mechanical behavior and failure criteria of the intact rock and rockmass. • Mechanical behavior of rock and soil formations in relation to the construction of underground structures- pertinent laboratory tests to define critical characteristics  • Study and design of tunnels (distribution of stresses and deformations, excavation of tunnels, ΝΑΤΜ and ΤΒΜ methods, support of tunnel walls, waterproofing of tunnels, etc.). Presentation of numerical methods. • Monitoring of the behavior of underground structures  • Specific construction subjects |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam that comprises:  •Theoretical questions of knowledge and critical thinking  • Solving of problems-exercises  Delivering of an individual project that comprises:  • Processing and solving of subjects pertinent to the study of underground structures-tunnels • Examination of the basic concepts of the subject |

**ATTACHED BIBLIOGRAPHY**

• [in Greek] Μαραγκός Δ. (2000), "Τεχνικά Έργα Υποδομής (2η έκδοση)", Εκδόσεις Νικόλαος Μαραγκός, ISBN: 960-7834-00-3  
• [in Greek] Κωστόπουλος Σ. (2014), " Σήραγγες. Κατασκευαστική Τεχνική, Υπολογιστική Διερεύνηση, Συμβασιακά Θέματα", Εκδόσεις Ίων, ISBN: 978-960-508-115-7  
• [in Greek] Αγιουτάντης Γ.Ζ. (2019), " Στοιχεία Γεωμηχανικής. Μηχανική Πετρωμάτων", Εκδόσεις Ίων, ISBN: 978-960-508-302-1

### Special Topics in Geotechnical Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ007 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Special Topics in Geotechnical Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to: • To recognize, understand and be able to evaluate the basic soil parameters related to its mechanical behavior under different loading conditions. • To be able to understand the role of underground water and its multifaceted influence on soil behavior. • To be able to identify the basic elements required for the design of special geotechnical engineering projects such as embankments, slopes, landslide protection projects, dams. | |
| **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*  *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…*  *…….* |
| The course contributes to the acquirement of the following capabilities: • Search, analysis and synthesis of information and data using the appropriate technology  • Decision making  • Student individual project • Design of geostructures • Respect of the physical environment | |

**SYLLABUS**

|  |
| --- |
| Deepening in soil behavior and study of special geotechnical engineering projects such as embankments, slopes, landslide protection projects, dams.  Content of theory lectures and practical exercises: • Connection with Soil Mechanics (soil characteristics, soil stresses, bearing capacity and soil settlements, active and passive earth pressures). • Intensive soil condition and loading history, stress paths, soil failure modes, residual soil strength, etc. • Influence of water on the mechanical behavior of soils. • Introduction to the design of special geotechnical engineering projects (embankments, slopes, landslide protection projects, dams). |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam that comprises:  •Theoretical questions of knowledge and critical thinking  • Solving of problems-exercises  Delivering of an individual project that comprises:  • Processing and solving of subjects pertinent to the study of underground structures-tunnels • Examination of the basic concepts of the subject |

**ATTACHED BIBLIOGRAPHY**

[In Greek] Κωστόπουλος Σ.Δ. (2008), "Γεωτεχνικές Κατασκευές ΙΙ", Εκδόσεις Ίων, ISBN: 978-960-411-657-7  
[In Greek] Ρόζος Δ. (2008), " Βελτίωση γεωτεχνικής συμπεριφοράς γεωλογικών σχηματισμών", Ηλεκτρονικό σύγγραμμα (διάθεση δωρεάν)  
[In Greek] Χριστούλας Στ. (1998), "Επιλογές Εφαρμοσμένης Γεωτεχνικής Μηχανικής", Εκδόσεις Συμεών, ISBN: 978-960-7888-11-1  
[In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0

### Geo-environmental Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ008 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Geo-environmental Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Understand the basic parameters related to subsoil pollution both at the level of waste management and in terms of geotechnical/geological characteristics.  • Distinguish, recognize, and be able to evaluate cases of subsoil pollution.  • To perceive and understand the causes of pollution in each examined case and to be able to estimate the level of the problem.  • To propose solutions regarding the restoration of pollution that has occurred in specific case studies.  • Formulate solutions based on the knowledge acquired during the lessons, assessing the particular requirements of the problem at hand. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search for, analysis and synthesis of data and information  • Decision-making  • Working independently   • Project planning  • Respect for the natural environment  • Working in an interdisciplinary environment | |

**SYLLABUS**

|  |
| --- |
| The course focuses on subsoil pollution and protective and remedial measures to be taken, regarding the management (transportation, storage and disposal) of waste of various kinds (solid and liquid waste, toxic substances, etc.).  Content of theory lectures and exercises:  • Introduction to the subject.  • Presentation of different forms of subsoil pollution (contamination from the management of solid and liquid waste, toxic substances, etc.). Effects of pollutants on the environment and on humans.  • Efficient waste management procedure in relation to the subsoil - Related code and legislation provisions. Protective measures to prevent pollution. Selection criteria and design of waste containment or disposal facilities and sites.  • Measures to address soil pollution - decontamination methods and remediation techniques.  • Case studies related to subsoil pollution problems. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises Written assignment (compulsory) which includes: • Processing and solving exercises-problems • Assessment of understanding key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Καββαδάς Μ. (2013), "Στοιχεία Περιβαλλοντικής Γεωτεχνικής", Εκδόσεις Τσότρας, ISBN: 978-618-80741-0-1
  
• [In Greek] Βουδούρης Κ.Σ.. (2009), " Υδρογεωλογία περιβάλλοντος. Υπόγεια νερά και περιβάλλον", Εκδόσεις ΤΖΙΟΛΑ, ISBN: 978-960-418-170-4**

### Geographic Information Systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ007 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Geographic Information Systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to recognize the qualitative and quantitative dimensions of spatial data and geographic information systems, effectively utilize individual quantitative methods and techniques of geographic analysis and gain proficiency in Geographic Information System (GIS) software. | |
| **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*  *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…*  *…….* |
| The course contributes in the acquisition of the following skills: - Search for, analysis and synthesis of data and information, with the use of the necessary technology  - Adapting to new situations  - Decision-making  - Working independently  - Project planning and management - Respect for the natural environment | |

**SYLLABUS**

|  |
| --- |
| Introduction to Geographic Information Systems (GIS). Main concepts in GIS. Geodetic reference systems - projection systems. Spatial analysis and methodology. Entity representation: vector and raster models. Spatial and semantic data. Representation of vector and raster data. Topological data structure and analysis. Database structure and management - Database management systems. Thematic mapping. Cartographic rendering – spatial data visualization. Analysis in GIS. Pre-analytical processes. Vector data analysis. Grid element analysis. Spatial analysis methods [Point distributions: analysis of spatial patterns, Continuous surface distributions: analysis of spatial interpolation, Discontinuous surface distributions: analysis of surfaces as polygons - points]. Spatial sampling and sampling types. Integrated spatial approach. GIS - Spatial analysis and design. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 48 | | Practice/exercises | 30 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 wtitten examination (100%) -open ended questions -problem solving OR Final writtn examination (70%) assignment - optional (30%) |

**ATTACHED BIBLIOGRAPHY**

[In Greek]. Κουτσόπουλος, Κ., 2017. «Γεωγραφικά Συστήματα Πληροφοριών και Ανάλυση Χώρου», 1η Έκδοση, ΕΚΔΟΣΕΙΣ ΔΙΣΙΓΜΑ ΙΚΕ, ISBN: 978-618-5242-11-4.
  
[In Greek]Κουτσόπουλος, Κ., Ανδρουλακάκης, Ν., 2011. «Γεωγραφικά Συστήματα Πληροφοριών με το ArcGIS 10», 1η Έκδοση, Α. ΠΑΠΑΣΩΤΗΡΙΟΥ ΣΙΑ Ι.Κ.Ε., ISBN: 978-960-491-030-4.
  
[In Greek]. Τσουχλαράκη, Α., Αχιλλέως, Γ., Κουργιαλάς N., 2019. «Μαθαίνοντας τα GIS στην πράξη: To ArcGIS 10.5», 3η Έκδοση, ΕΚΔΟΣΕΙΣ ΔΙΣΙΓΜΑ ΙΚΕ, ISBN: 978-618-5242-57-2.
  
[In Greek]. Τσούλος, Λ., Σκοπελίτη, Α. Στάμου, Λ., 2016. Χαρτογραφική Σύνθεση και Απόδοση σε
  
Ψηφιακό Περιβάλλον, Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", ISBN: 978-960-603-271-4.

### Transportation Planning

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ008 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Transportation Planning | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to: • assess the traffic impacts expected to arise from the implementation of transportation projects and the implementation of transport policies. • take into account the above elements in the design of transportation systems, within the framework of decision-making processes. | |
| **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*  *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…*  *…….* |
| The course contributes in the acquisition of the following skills: • Investigation, analysis and synthesis of data and information, with the use of appropriate technologies • Adaptation to new conditions  • Decision making • Project planning and management • Natural environment preservation | |

**SYLLABUS**

|  |
| --- |
| Course lecture content: • Transportation system. Procedures and stakeholders. Types and subjects of studies in the field of transport. • Transport planning concepts. Principles and relations of traffic flow, speed and density and other parameters. • Sampling. • Data collection and processing methodology. • Models in transport planning and their statistical evaluation. • Trip Generation  • Trip Distribution  • Modal split  • Disaggregated behavioral models.  • Network trip assignment |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | • Lectures Presentation using laptop and video projector or remotely, e-lecture if required. • Learning process support through the electronic e-learning platform. • Distance meetings between teacher and students for collaboration outside of class (via a digital platform, e.g. ZOOM, Skype). • Posting announcements on the Department's website and on the online page of the course within the electronic e-learning platform. • Teacher and student communication via email. • Student evaluation |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 48 | | Practice/exercises | 30 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam including: • Theory questions • Exercises solving The evaluation criteria are communicated to the students in the first lecture of the course. Also, each student is given the opportunity to check their writing and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

\_Stathopoulos A.G., Karlaftis M., (2016). Transportation Systems Planning. Ed. PAPASOTIRIOU, ISBN: 978-960-491-101-1 [In Greek].  
\_Frantseskakis, I.M., Giannopoulos, G.A. (2005). Transportation Planning and Traffic Engineering. Epikentro Publications SA, ISBN: 978-960-6647-20-8 [In Greek].

### Urban Transport Systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ009 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Urban Transport Systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to: • Understand the principles of design, study, evaluation, and operation of Mass Transportation Systems. • Understand the principles of an urban freight transport system. • Design an urban transportation system taking into account the principles of a sustainable mobility system. | |
| **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*  *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…*  *…….* |
| The course contributes to the acquisition of the following skills: • Search, analysis and synthesis of data and information, using the necessary technologies • Adaptation to new conditions • Decision making • Project planning and management • Natural environment preservation | |

**SYLLABUS**

|  |
| --- |
| Course lecture content: • Public Transportation. • Integrated Combined Urban Transport Systems. • Urban passenger bus lines. • Urban bus line design. • Bus lanes and special lanes for the exclusive use of buses. • Bus priority measures in mixed traffic conditions. • Improvement and promotion of Mass Transportation. • Fixed track mass transit systems. • Urban freight transport. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | • Lectures Presentation using laptop and video projector or remotely, e-lecture if required. • Learning process support through the electronic e-learning platform. • Distance meetings between teacher and students for collaboration outside of class (via a digital platform, e.g. ZOOM, Skype). • Posting announcements on the Department's website and on the online page of the course within the electronic e-learning platform. • Teacher and student communication via email. • Student evaluation |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 30 | | Project(s) | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam including: • Theory questions • Compulsory individual project with oral presentation in class The evaluation criteria are communicated to the students in the first lecture of the course. Also, each student is given the opportunity to check their graded sheet and have their performance analyzed. |

**ATTACHED BIBLIOGRAPHY**

\_Gavanas, N., Papaioannou, P., Pichiava-Latinopoulou, M., Politis, I. (2016). Urban transport networks and mobility management. Greek Academic Electronic Books and Aids - "Kallipos" Repository, ISBN: 978-960-603-155-7 [In Greek].  
\_Giannopoulos, G.A. (2005). Public Urban Transportation, Bus Transportation. Epikentro Publications S.A., ISBN: 978-960-6645-29-7 [In Greek].  
\_Karlaftis, M., Lymberis, K. (2009). Urban Transportation Systems. Symmetry, Ed. ATHANASOPOULOS co., ISBN: 978-960-266-279-3 [In Greek].  
\_Stathopoulos A.G., Karlaftis M., (2016). Transportation Systems Design. Ed.PAPASOTIRIOU co., ISBN: 978-960-491-101 [In Greek].  
\_Franzeskakis, I.M., Pichiava-Latinopoulou, M.H., Tsamboulas, D.A. (2002). Traffic Management. Ed. PAPASOTIRIOU co., ISBN: 978-960-7510-50-1 [In Greek].  
\_Sussman J., (eds) Schinas, O., Papadimitriou, E. (2003). Introduction to Transportation Systems, Ed. Stamouli SA, ISBN: 960-351-395-4 [In Greek].  
\_Taniguchi, E., Thompson, R.G. (2018). City Logistics 1: New Opportunities and Challenges. Wiley-ISTE, HEAL-Link Wiley UBCM ebooks, ISBN: 9781119425519.

### Transport Economics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ010 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Transport Economics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to collect data and classify construction and cash flows of a transportation system or enterprise, combine the above data to predict cost elements necessary for the construction or improvement of a transportation system or enterprise, implement this knowledge for determining the financial demands for the foundation and operation of transportation system or enterprise, to assess the efficiency of the invested funds, analyze the components and operations of transportation system or enterprise, to clarify, to classify and prioritize the, according to cost and criteria of function, compose the sum of individual cost estimates into a single framework of cash flow, anticipating future changes, running parallel with alternative scenarios, evaluate, justify and argue for the best investment in a of transportation system or enterprise, taking into account socio-economic, technical and environmental criteria. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Transportation and financial activities, transport systems, road, railway, air and maritime transport, transportation enterprises, effects of globalization, state monopolies, liberalization, privatization, elasticities, normal, inelastic and derivative demand, financial planning and accounting analysis of transport companies, construction and operational cost, combined transportation systems, logistics in freight transport, definition and characteristics of transport demand forecasting models, assessment of the predictive capability of a model, targets of the commercial policies of transport companies, public service obligations, pricing policies of transport companies, evaluation methods of transportation projects, sensitivity and risk analysis, multi-criteria and financial analyses of transportation projects, public-private partnership for the construction of transportation projects, transportation companies in Greece. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises)  The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• [in Greek] Μουρμούρης, Ι.Κ. (2006). Οικονομική των Μεταφορών - Ανάπτυξη, Επένδυση, Διοίκηση Εφαρμογές. ΕΚΔΟΣΕΙΣ ΣΤΑΜΟΥΛΗ ΑΕ, ISBN: 960-351-671-6.  
• [in Greek] Προφυλλίδης, Β. (2016). Οικονομική των Μεταφορών. Α. ΠΑΠΑΣΩΤΗΡΙΟΥ ΣΙΑ Ι.Κ.Ε., ISBN: 978-960-491-100-4.  
• [in Greek] Σαμπράκος, Ε. (2018). Οικονομική των Μεταφορών. Εκδόσεις Βαρβαρήγου, ISBN: 978-960- 7996-75-6.  
• [in Greek] Boyer K.D. (2005). Οικονομική των Μεταφορών. Γ.ΠΑΡΙΚΟΣ ΣΙΑ ΕΕ, ISBN: 978-960-286- 754-9.  
• Prassas, E.S., Roess, R.P. (2013). Engineering Economics and Finance for Transportation Infrastructure. Springer Berlin Heidelberg, HEAL-Link Springer ebooks, ISBN: 978-3-642-38580-3.  
• Profillidis, V.A., Botzoris, G.N., Galanis, A.T. (2014). Environmental Effects and Externalities from the Transport Sector and Sustainable Transportation Planning - A Review. International Journal of Energy Economics and Policy, 4(4), 647-661.

### Sustainable Urban Mobility

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ011 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Sustainable Urban Mobility | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to identify gaps in conventional approaches to transport for the achievement of sustainable urban mobility,  • Implement alternative approaches to the design of urban transport,  • Design infrastructure for non-motorized vehicles,  • Identify key factors that influence transport choices and transport behavior,  • Familiarize with current transport technologies,  • Define basic principles for drafting a Sustainable Urban Mobility Plan | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| European transport policy for urban mobility  • Urban mobility and analysis of commuters’ travel behavior  • Sustainable development and sustainable urban mobility • Sustainable transport modes (walking, cycling) and their infrastructure • Methodologies of road safety audit and mobility of pedestrians and cyclists in the urban environment • Shared transport, micromoblility • Autonomous and electric vehicles • Intelligent Transport Systems and sustainable urban mobility • Energy, environment and economy of transport • Safety, accessibility and social issues of transports • Sustainable Urban Mobility Plans. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises)  The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

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• [in Greek] Γαβανάς, Ν., Παπαϊωάννου, Π., Πιτσιάβα-Λατινοπούλου, Μ., Πολίτης, Ι. (2016). Αστικά δίκτυα μεταφορών και διαχείριση κινητικότητας. Ελληνικά Ακαδημαϊκά Ηλεκτρονικά  
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• Gudmundsson, H., Hall, R.P., Marsden, G., Zietsman, J. (2016). Sustainable Transportation, Indicators, Frameworks, and Performance Management (Springer Texts in Business and Economics). Springer Berlin Heidelberg, HEAL-Link Springer ebooks, ISBN: 978-3-662-46924- 8.  
• National Association of City Transportation Officials (2014). Urban Bikeway Design Guide. Island Press/Center for Resource Economics, HEAL-Link Springer ebooks, ISBN: 978-1-61091- 582-3.

### Open Channel and River Hydraulics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ006 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Open Channel and River Hydraulics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Background | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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 successful completion of the course will enable students to  - define the appropriate hydraulic method for solving complex problems related to open channel systems and river flows  - design open channels and culverts of various dimensions - study of natural streams and determine water and solid discharge - determine channel conveyance and evaluate the impact of bridges on the flow in streams and rivers - propose and design river training and flood protection works - assess and apply computer codes for flow computations in streams and rivers. | |
| **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*  *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…*  *…….* |
| - Search for, analysis and synthesis of data and information, with the use of the necessary technology  - Adapting to new situations  - Decision-making  - Team work - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| - Introduction to open channel. Application of theory of critical depth, flow over a step and through, narrowing and widening of a cross-section. - Steady state free surface flow: Flow characteristics. Uniform flow. Definitions and equations. - Manning and Chezy equations. Uniform flow in compound channels. - Cross-sections of composite shape. Best hydraulic cross-section. - Specific force. Critical depth. Calculation of critical depth. Control cross-sections.  -Gradually varied flow in streams and rivers. Computations.  -Hydraulic jump and its features. Hydraulic jump on horizontal channel. Location of hydraulic jump  -The code HEC-RAS (River Analysis System). Application examples.  -Profile classification.  -Flow calculations from spillways and lake outlets -Sediment Discharge in natural streams. Bed Load. Suspended Load |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Formative evaluation consisted of:  - Non-compulsory intermediate essays (5 to 6 in total) (30% of final mark) focused on solving problems : - Final written exams (70% of final mark) consisted of: a) multiple choice and short answer questions on the basic theory of the course (10% of the final mark)  b) Solving of problems/questions (60% of the final mark) |

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- [in Greek] Λιακόπουλος Αντώνης, Υδραυλική, Εκδόσεις ΤΖΙΟΛΑ, 2020 (3η έκδοση), ISBN: 978-960-418-775-1. Κωδικός Βιβλίου στον Εύδοξο: 77107649  
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### Urban Waste Treatment Technology

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ007 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Urban Waste Treatment Technology | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of this course, students will be able to: • know the basic water and wastewater treatment processes • distinguish and explain the treatment stages of a municipal wastewater treatment plant • analyse water quality characteristics and distinguish water pollution • calculate the hydraulic layout of municipal wastewater treatment projects • assess water and wastewater treatment studies • prepare a technical report containing the sanitary calculations, hydraulic calculations and general arrangement drawings of relative projects | |
| **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*  *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…*  *…….* |
| • Search, analysis and synthesis of data and information • Adapting to new situations • Decision making • Individual work • Project design and management • Criticism • Promoting free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| The course aims to provide students with the basic theoretical background for the course 'YDR007 Municipal Wastewater Treatment and Management'. It includes the necessary teaching material for understanding the treatment of natural water towards the production of high quality water through purification processes and methods and the analysis of wastewater treatment processes, as well as the design of relative projects.  Lectures’ content: o The hydrological cycle. Groundwater, surface water, seawater. Water consumption. o Water quality characteristics (physico-chemical and microbiological parameters). Legislative framework. Water pollution – contamination. Protection measures. o Groundwater and surface water treatment processes. Standard treatment, advanced treatment. o Water treatment plants: Flocculation, sedimentation, filtration, adsorption, disinfection, water storage and distribution. o Typical wastewater treatment system. Preliminary and primary treatment. General principles of wastewater and sludge treatment. o Introduction to the activated sludge model (organic carbon removal and nitrification). Aeration tank design criteria. Sedimentation tank design and operation. o Analysis of sludge treatment processes. Sludge thickening (gravity thickeners, mechanical thickeners). Sludge stabilisation (aerobic and anaerobic digestion). Sludge dewatering. Sludge disposal and utilisation. o Design principles for pre-treatment, primary treatment, biological treatment and tertiary treatment of municipal wastewater. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Support of the learning process (Teaching and Communication with students) through PowerPoint lectures, through the course website, through the 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 page. Teacher-student collaboration time either by physical presence or by teleconference. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Project(s) | 10 | | Individual study | 68 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Language of Evaluation: Greek Written test with extended answer questions (formative and/or inferential) Theory assessment (80% of the final grade): • A written progress examination (20% of the final grade) including: - Theoretical Extended Response Questions (formative and/or inferential) - Problem-solving exercises • Written final examination (60% of the final grade) including: - Theoretical extended response questions (formative and/or inferential - Problem-solving exercises Individual homework (20% of the final grade)  The present course description with the assessment criteria is accessible to students in the Departmental study guide (Departmental website) and on the course website.  The outline is communicated orally to students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [in Greek] Νταρακάς Ευθύμιος, ΤΕΧΝΙΚΗ ΠΕΡΙΒΑΛΛΟΝΤΟΣ, Διεργασίες Επεξεργασίας Νερού και Υγρών Αποβλήτων, Εκδόσεις Εκδόσεις "σοφία", 2016, ISBN: 978-960-6706-91-2. Κωδικός Βιβλίου στον Εύδοξο: 59380527  
• [in Greek] Νταρακάς Ευθύμιος, Πεταλά Μαρία, Τσιρίδης Βασίλειος, Περιβαλλοντική Χημεία και Μηχανική, Εκδόσεις ΤΖΙΟΛΑ, 2019, ISBN: 978-960-418-640-2. Κωδικός Βιβλίου στον Εύδοξο: 86054621  
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• [in Greek] Γκουντούλας Κων/νος, Διαχείριση Ιλύος από Εγκαταστάσεις Επεξεργασίας Λυμάτων, Εκδόσεις ΑΛΕΞΑΝΔΡΟΣ Ι.Κ.Ε., 2019 (2η έκδοση), ISBN: 978-618-84462-2-9. Κωδικός Βιβλίου στον Εύδοξο: 86200230

### Computational Methods in Fluid Mechanics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ008 | **SEMESTER** | | 7th | |
| **COURSE TITLE** | Computational Methods in Fluid Mechanics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of this course, students will be able to: recognize and identify the basic principles of numerical methods reported for solving fluid mechanics problems solve fluid flow equations and systems of equations using computational techniques and synthesize numerical fluid flow analysis models | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Working independently \_Project planning and management  \_Criticism \_Production of free, creative and inductive thinking. | |

**SYLLABUS**

|  |
| --- |
| Computational Fluid Mechanics. Basic considerations, flow equations and function and required numerical algorithm development steps. Fluid flow numerical solving techniques. Types of partial differential equations for flow mechanics and ierative processes for solving. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Language of Evaluation: Greek. Written test with extended answer questions (formative and/or inferential). Theory assessment (100% of the final grade): • A written progress examination (30% of the final grade) including: \_Theoretical Extended Response Questions (formative and/or inferential) \_Problem-solving exercises. • Written final examination (70% of the final grade) including: \_Theoretical extended response questions (formative and/or inferential) \_Problem-solving exercises. The present course description with the assessment criteria is accessible to students in the Departmental study guide (Departmental website) and on the course website. The outline is communicated orally to students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Σούλης Ιωάννης, ΥΠΟΛΟΓΙΣΤΙΚΗ ΜΗΧΑΝΙΚΗ ΡΕΥΣΤΩΝ, Εκδόσεις ΧΑΡΑΛΑΜΠΟΣ ΝΙΚ. ΑΪΒΑΖΗΣ, 2008, ISBN: 978-960-99293-2-5. Κωδικός Βιβλίου στον Εύδοξο: 1100  
• [In Greek] Σούλης Ιωάννης, Υπολογιστικές τεχνικές Υδραυλικής Μηχανικής, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016, ISBN: 978-960-603-044-4. Κωδικός Βιβλίου στον Εύδοξο: 320306  
• [In Greek] Κουτίτας Χριστόφορος, Υπολογιστική υδραυλική, Εκδόσεις Επίκεντρο, 2005, ISBN: 978-960- 6645-50-1. Κωδικός Βιβλίου στον Εύδοξο: 15198  
• [In Greek] Μπεργελές Γ., Υπολογιστική ρευστομηχανική, Εκδόσεις Συμεών, 2012 (5η έκδοση), ISBN: 978-960-9400-37-4. Κωδικός Βιβλίου στον Εύδοξο: 59374709  
• [In Greek] Στάμου Αναστάσιος, Εφαρμοσμένη Υδραυλική, Εκδόσεις Παπασωτηρίου, 2016 (3η έκδοση), ISBN: 978-960-491-109-7. Κωδικός Βιβλίου στον Εύδοξο: 59397206**

### Reinforced Concrete III

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ024 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Reinforced Concrete III | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=990 | | | | |

**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* | |
| Upon successful completion of this course, students will be able to: • know the basic water and wastewater treatment processes • distinguish and explain the treatment stages of a municipal wastewater treatment plant • analyse water quality characteristics and distinguish water pollution • calculate the hydraulic layout of municipal wastewater treatment projects • assess water and wastewater treatment studies • prepare a technical report containing the sanitary calculations, hydraulic calculations and general arrangement drawings of relative projects | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Seismic design actions according to Eurocode 8 for frame and dual reinforced concrete structures  • Medium and high ductility structures according to Eurocode 8  • Capacity design of beams, columns and shear walls. Avoidance of soft-storey failure, of local plasticity checks.  • Dimensioning of reinforced concrete shear walls (design envelopes against bending and shear)  • Medium and high ductility nodes  • Simulation of a dual reinforced concrete structure (frames and walls) in a finite element program. Calculation of element forces envelopes.  • Pathology of reinforced concrete structures |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 20 | | Individual study | 58 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught (30%). 2. Final written exam (in Greek) at the end of the semester (70%). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Penelis G., Stylianidis K., Kappos A., Ignatakis Ch., Design of Reinforced Concrete Structures According to the New Concrete and Seismic Codes, AUTh publ., 1995 (in Greek)  
Georgopoulos Th., Reinforced Concrete vol. II, Georgopoulos publ., 2015 (in Greek)  
Tsonos A.D., Design of Reinforced Concrete Structures according to the Eurocodes, Sofia publ., 2016 (in Greek)  
Penelis G Penelis Gr., Concrete Buildings in Seismic Regions, 2nd ed, 2019, Taylor Francis  
Karayiannis Ch., Design and Performance of Reinforced Concrete Structures for Seismic Loads, Sofia publ., 2016 (in Greek)  
Konstantinidis Ap., Earthquake Resistant Buildings made of reinforced concrete. Static and dynamic analysis, π-Systems, 2013  
Konstantinidis Ap., Earthquake Resistant Buildings made of reinforced concrete. made of reinforced concrete, The Art of Construction and the Detailing, π-Systems, 2014

### Earthquake Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ023 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Earthquake Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/enrol/index.php?id=1035 | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: become familiar with the background of seismic design for structures delve into the determination of seismic actions through design response spectra understand the concept and estimate the ductility of structures become familiar with the philosophy of performance-based seismic design know how to apply non-linear analysis methods for the design and assessment of structures against seismic actions get acquainted with new technologies in seismic design, such as seismic isolation. recognize seismic damage and propose methods for their restoration, as they will learn the appropriateintervention technologies | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Elements of Technical Seismology. Earthquake genesis – distribution. Strong ground motion – recordings. Magnitude and intensity.  • Seismic hazard – risk. Elements of Seismic Mechanics.  • Elastic response spectra. Inelastic response – hysteretic damping – ductility. Design spectra.  • Building analysis for seismic actions. Plasticity of structural elements and carriers.  • Background of seismic design regulatory provisions.  • Structural elements under seismic load. Beam-column nodes under seismic load.  • Seismic pathology. Technology of repair and strengthening of buildings. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Psycharis I., Earthquake Engineering Notes Vol. 1, NTUA publ., 2016 (in Greek)  
Chopra, A.K. (1995) Dynamics of Structures: Theory and Applications to Earthquake Engineering. Prentice-Hall, New Jersey  
Fardis, Michael, et al. Designers' Guide to EN 1998-1 and 1998-5. Eurocode 8: Design Provisions for Earthquake Resistant Structures. Thomas Telford Publishing, 2005.  
Anastasiadis K., Earthquake Resistant Structures vol. I, Ziti, 1989 (in Greek)

### English-Technical terminology

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΝ010 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | English-Technical terminology | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 2 | | 0 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Skills Development | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to read and use technical terminology in the field of Civil Engineering, both in oral speech and in text. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: - Working independently  - Team work | |

**SYLLABUS**

|  |
| --- |
| Students are introduced to a variety of academic and technical texts and forms of writing, oriented towards the field of civil engineering. They also are encouraged to develop their oral expression and speech skills. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***0*** | |
| **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 comprising of open-ended questions, writing in English and text translation. |

**ATTACHED BIBLIOGRAPHY**

\_Evans Virginia, Dooley Jenny, Chavez Mark (2015), “Career Paths Construction 1 Buildings
  
Student's Book With Cross-Platform Application”, EXPRESS Publishing.
  
\_ Evans Virginia, Dooley Jenny, Chavez Mark, “Career Paths Construction 2 Roads Highways
  
Student's Book With Cross-Platform Application”, EXPRESS Publishing.
  
\_Panourgia E. (2015), “Integrating Technical Academic Writing into your English Course -
  
Theory and Practice”, ΑΛΕΞΑΝΔΡΟΣ Σ. Ι.Κ.Ε.

### Numerical Simulation and Analysis of Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ025 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Numerical Simulation and Analysis of Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=712 | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Recognize, understand and classify the type of finite elements used in a case study.  • Distinguish and comprehend the parameters and assumptions related to simulation issues and identify potential weaknesses when simulating specific structures.  • Select the appropriate simulation approach, potentially combining different types of finite element types and parameters.  • Develop, using appropriate computing tools (specialized computer software), computing models by assembling individual parts of the examined problem.  • Integrate skills from different fields, while complying with the contemporary code provisions, in a unified structural simulation and analysis environment, in order to solve a civil engineering problem.  • Evaluate the effectiveness and assess the accuracy of selected simulation approaches, both on the basis of the general principles learned during the lectures as well as on the basis of critical evaluation of analysis results. | |
| **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*  *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…*  *…….* |
| • Search, analysis and synthesis of information and data, utilizing the required technology  • Decision making   • Working independently   • Project planning | |

**SYLLABUS**

|  |
| --- |
| The aim of the course is to help the student understand the basic principles of simulation and analysis of structures utilizing computer software (Computer Aided Analysis) and following the code regulations, in order to develop the ability to synthesize and apply knowledge from different topics of the civil engineering scientific field. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Learning and utilization of specialized structural analysis software (computer aided analysis). Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 28 | | Individual study | 50 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final exam including: • Theoretical knowledge and judgment questions on course subjects • Questions on structural simulation and behavior issues • Assessment of understanding of key concepts Lab examination (in specialized computer software) including: • Simulation of a case study • Analysis and evaluation of results |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Κίρτας Ε., Παναγόπουλος Γ. (2015), "Προσομοίωση Κατασκευών σε Προγράμματα Η/Υ: Εφαρμογές με το πρόγραμμα πεπερασμένων στοιχείων SAP 2000 (Ηλεκτρονικό Βιβλίο)", Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών, Αθήνα (Διαθέσιμο online: http://hdl.handle.net/11419/1607)  
• [In Greek] Αβραμίδης Ι.Ε., Αθανατοπούλου Α., Μορφίδης Κ., Σέξτος Α. (2017), "Αντισεισμικός σχεδιασμός κτιρίων Ο/Σ και αριθμητικά παραδείγματα ανάλυσης διαστασιολόγησης σύμφωνα με τους Ευρωκώδικες", Εκδόσεις Σοφία, Θεσσαλονίκη, ISBN: 978-960-6706-97-4  
• [In Greek] Αβραμίδης Ι.Ε., Αθανατοπούλου Α., Μορφίδης Κ., (2016), "Η μέθοδος των πεπερασμένων στοιχείων", Εκδόσεις Σοφία, Θεσσαλονίκη, ISBN: 978-960-6706-92-9  
• [In Greek] Κωμοδρόμος Π. (2018), "Ανάλυση Κατασκευών: Σύγχρονες μέθοδοι με χρήση Η/Υ (3η έκδοση)", Εκδόσεις Κλειδάριθμος ΕΠΕ, ISBN: 978-960-461-860-6  
• [In Greek] Αβραμίδης Ι.Ε. (2001), "Αριθμητικές Μέθοδοι Ανάλυσης Κατασκευών", Πανεπιστημιακές Σημειώσεις, Εκδόσεις ΑΪΒΑΖΗ, Θεσσαλονίκη   
• Reddy J.N. (1993), "An introduction to the finite element method", McGraw-Hill Inc., New York   
• [In Greek] Υ.ΠΕ.ΧΩ.Δ.Ε (2000), "Ελληνικός Αντισεισμικός Κανονισμός, EAK2000", Αθήνα  
• [In Greek] Υ.ΠΕ.ΧΩ.Δ.Ε (2000), "Ελληνικός Κανονισμός Ωπλισμένου Σκυροδέματος, EKΩΣ 2000", Οργανισμός Αντισεισμικού Σχεδιασμού και Προστασίας (ΟΑΣΠ), Αθήνα  
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• CEN, European Committee for Standardization (2004), "EN 1998–1: Eurocode 8: Design of structures for earthquake resistance, Part 1: General rules, seismic actions and rules for buildings", European Committee for Standardisation, Brussels

### Prestressed Reinforced Concrete - Special Concrete Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ026 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Prestressed Reinforced Concrete - Special Concrete Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course students will be able to: 1. Understand the behavior and design principles of prestressed concrete structures for various prestressing methods. 2. To design and dimension prestressed concrete structural elements against bending and shear. 3. Calculate the stress state of prestressed members, calculate the prestress losses and design the tendons. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Project planning and management \_Decision making. \_Autonomously working \_Promotion of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| \_Principles of design of prestressed structures. Prestressing materials and techniques. Types, characteristics and mechanical properties of tendons. \_Prestressing systems. \_Structural elements under central or eccentric prestressing force. \_Design at the serviceability limit state. \_Cracking check. \_Preload losses (momentary and long-term) \_Tendon anchoring systems. Single and multiple anchoring systems. \_Design to failure limit state. Bending and shear checks. \_Partial prestressing. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 20 | | Individual study | 58 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | The final evaluation is composed of marks collected from different parts of the teaching process, as follows: 1. Individual compulsory project (30% of the final grade) 2. Final written exams (70% of final grade) |

**ATTACHED BIBLIOGRAPHY**

[In Greek] Christos Karayiannis, (2015). Constructions Design by Prestressed Concrete. Publications Sofia, Thessaloniki.  
[In Greek] T. Tasios, P. Giannopoulos, Κ. Τrezos, S. Tsoukantas, (1986), Prestressed Concrete,Publ. Symmetry, Athens.  
[In Greek] Μ.Ν. Fardis, (2018) Prestressed Concrete. University of Patras Publishing House

### Architectural Design

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ027 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Architectural Design | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/ | | | | |

**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* | |
| • Recognize and define the concepts of Space, Architecture and Architectural Design - understand and use of the relevant terminology. Analyze small scale architectural projects.  • Understand the purpose of Architectural Design (historically, socially, culturally, environmentally, technologically) and review its methodology. Define and distinguish the role and responsibilities of the head designer within a group of engineers having to produce a building project.  • Evaluate the specificities of the designing of a medium architectural complexity project (i.e. suburban detached house), distinguish and prioritize parameters which determine architectural and constructional aspects of the project, classify and illustrate design principles. Create and present the synthetic concept (main design idea).  • Understand and apply the constantly needed modifications in the designing process, become able to adopt this kind of flexibility, apply methods and tools that support an adaptability process.  • Create (design) small to medium scale building projects of simple functional requirements and simple but well-defined morphological identity. Organize and present these proposals with a maximum level of quality and completeness.  • Evaluate in comparison different designed or constructed building-project proposals and decide for interventions or final options which will support the projects’ sustainability and bring the optimal conditions for the final occupants. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_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 \_Criticism and self-criticism \_Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| The course introduces students to basic concepts of Space, Architecture and Architectural Design with the aim of understanding the importance of architectural projects and mastering an established scientific language that is used internationally, in the context of the interdisciplinarity required when different Engineers specialties collaborate for Construction. Emphasis is placed on the methodological, analytical and synthetic character of Architectural Design with the aim of familiarizing and acquiring basic knowledge about concepts such as spatial Form and Function, the integration of the building into its environment (context), the central synthetic idea (concept) and its transformations, the publicization and communication of the architectural projects, the dialogue of the composer (Architect/ Engineer) with the scientific and technical world, as well as with the final recipients of his work (inhabitants). |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 38 | | Individual study | 40 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | The final evaluation is composed of marks collected from different parts of the teaching process, as follows: \_Written or oral examination (end of semester): 50% of the final grade \_ Quality of exercises, assignments, and design projects (developed during the semester): 40% of the final grade \_Participation in the course procedures (i.e. oral participation, meeting deadlines for handing in written work): 10% of the final grade.  The evaluation criteria are listed in the introductory handout of the course, which is posted on the e-learning platform in the beginning of the semester and is also distributed and presented to the students during the 1st class meeting. |

**ATTACHED BIBLIOGRAPHY**

\_Francis D. K. Ching, 2014 (4th edition). Architecture: Form, Space, and Order. John Wiley Sons.  
\_ Kenneth Frampton, 2007 (4th edition). Modern Architecture: A Critical History. Thames Hudson.  
\_ Jordan, R. Furneaux, 1970. A concise history of Western architecture. New York: Harcourt, Brace World.  
\_Kleine, G. Quibe, J., 1997. Houses: typology and form. Athens: Giourdas Editions [in Greek].   
\_ Petridou, Vasiliki Ziro, Olga, 2015. Arts and Architecture from renaissance to the 21st century. [e-book]. Athens: Association of Greek Academic Libraries (Kallipos). Available at: http://hdl.handle.net/11419/3541 [in Greek].

### Elastic Stability

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ028 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Elastic Stability | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students are expected to: 1) Identify problems related to the stability of structural elements and constructions. 2) Select appropriate strategies for addressing stability problems under static and dynamic loads. 3) Determine equilibrium paths and critical points in structures depending on the applied loading. 4) Evaluate the behavior of structural elements against buckling 5) Dimension the members and connections of the load-bearing system. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Principles of the elastic stability theory. Stable, unstable and neutral equilibrium. Bending as a stability issue. Differential bending equation.  Influence of axial forces. Bending as an eigenvalue problem. The influence of boundary conditions.  Stability criterion - Stability determinant, Orthogonality condition of functions. Energy methods (Timoshenko total potential). Rayleigh-Ritz and Galerkin methods.  The problem of elastic stability of surface structures. Strength and stability checks of shells, thin plates, tanks, and silos. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Gantes Ch., NonLinear Behavior of Structures, HEAL-Link, 2015, http://hdl.handle.net/11419/5318 (in Greek)  
Sogianopoulos D., NonLinear Stability of Structures, HEAL-Link, 2015, http://hdl.handle.net/11419/2024 (in Greek)  
Kounadis A., Elastic Stability Linear Theory 2nd ed., Symeon publ., 1997 (in Greek)  
Timoshenko Gere, Theory of Elastic Stability, Dover Civil and Mechanical Engineering, 2009, ISBN-10: 0486472078  
Bazant Cedolin, Stability of Structures Stability of Structures, Elastic, Inelastic and Damage Theories, 1991, Εκδόσεις Oxford University, ISBN-10: 0195055292

### Digital Tools for Design and Construction

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ029 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Digital Tools for Design and Construction | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr | | | | |

**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* | |
| Upon completing this course students should be able to work with a range of different software for the creation and constructional support of 3D objects. They should be able to model 3D geometry of a building or smaller structure, to share and transfer information from one software to the other, to select and share information required from other collaborating engineers and to familiarize with the BIM procedures (schedules, cost estimates) that will be required of them to participate in complex buildings. | |
| **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*  *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…*  *…….* |
| 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 | |

**SYLLABUS**

|  |
| --- |
| The course aims to introduce students to the creation of 3D geometry and 3D modeling in order to support the construction of buildings. BIM, CAD/CAM technologies, 3D printing and parametric modeling are key concepts that are presented and form the core of the projects handed to students. Special emphasis is placed on the sharing of information and the interoperability between different software. Students work with AutoCAD (3D), Revit and Rhinoceros, enabling them to work with a wide range of 3D modeling tools, depending on the task at hand, indicating the digital expertise needed to collaborate on a multitude of levels with other fields of engineering (geometry clashes, schedules, cost estimates, thermal performance, building maintenance, etc.) according to the project’s unique features. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, CAD software (AutoCAD, Revit), parametric modeling software (Rhinoceros), e-learning platform for educational material. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 20 | | Project(s) | 30 | | Project(s) | 40 | | Individual study | 40 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | - Short examination assignment (30%) - Individual assignment (compulsory) (30%) - Group assignement (compulsory) (40%) |

**ATTACHED BIBLIOGRAPHY**

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Loylakis, Ch., Autodesk Revit Architecture – Learning Guide”, Loulakis Polychronis , 2013.
  
Aubin, P., Stafford, S., Allen, L.,“The Aubin Academy Revit Architecture: 2016 and beyond”, G3B Press, 2015
  
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Woodbury, R., “Elements of Parametric Design”, Routledge, 2010.
  
Gramazio, F. Kohler, M, Willmann, J., “The Robotic Touch”, Park Books, 2014. https://thebimhub.com/
  
https://www.autodesk.com/
  
https://www.cibse.org/sde

### Special Topics in Steel Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ030 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Special Topics in Steel Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students are expected to: • Calculate critical loads of flexural buckling and the corresponding buckling lengths for axially compressed beams, frame members, or others. • Assess the influence of geometric imperfections, second-order effects, residual stresses and shear deformation of a member's cross-section, on the bearing capacity of elements under axial compression. • Understand and design steel structural elements consisting of plates with or without stiffeners. • Design simple cases of cylindrical steel shells. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Forms of instability of compressed truss elements. Second-order equilibrium (deformed state) of axially compressed rods. The influence of elastic supports on the critical load. Calculation of critical loads and the corresponding buckling lengths. The influence of the axial compressive force on the load-bearing capacity of a beam under simultaneous bending loads.  • Influence of residual stresses and shear deformation on the strength and load-bearing capacity of compressed elements. Regulatory provisions of EC3.  • Strength of planar steel structural elements stressed within their plane (discs).  • Load-bearing capacity of steel shells. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Vagias I, Gantes Ch., Ermopoulos I., Ioannidis G., Application Examples in Special Issues on Steel Structures, Kleidarithmos publ., 2014 (in Greek)

### Deep Foundations

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ009 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Deep Foundations | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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 aim of the teaching is the understanding of the concepts and theoretical principles of deep foundations and the ability to deal computationally with basic problems in this subject. Upon successful completion of the course, the student will be able to: • To recognize the various types of deep foundations and especially pile foundations. • To recognize, understand and be able to evaluate the cases in which the use of deep foundation is required. • To distinguish and understand the basic physical and mechanical soil parameters related to the study and analysis of deep foundations. | |
| **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*  *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…*  *…….* |
| • Decision making  • Design of assignments  • Student individual project • Promotion of the free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Study, analysis and design of various types of deep foundations and especially pile foundations. It includes the determination of the loading, the calculation of the intensive state and the process of designing, reinforcement and structural configuration based on the modern regulations.  Content of theory lectures and practical exercises: • Introduction to the types of deep foundations and their construction methods • Single pile and pile group bearing capacity study under axial loading • Single pile and pile group bearing capacity study under horizontal loading • Calculation of single pile and pile group settlements • Special topics for the study of pile foundations (pile-soil interaction, non-linear analysis, negative friction, test loads, etc.). |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Individual project aiming at better understanding the teaching concepts  2. Final written exam at the end of the semester (in Greek language) |

**ATTACHED BIBLIOGRAPHY**

[In Greek] Αναγνωστόπουλος Α.Γ., Παπαδόπουλος Β.Π. (2004), "Θεμελιώσεις με Πασσάλους", Εκδόσεις Συμεών, ISBN: 978-960-7888-50-2  
[In Greek] Κωμοδρόμος Α.Μ. (2019),"Θεμελιώσεις, Αντιστηρίξεις: οριακή ισορροπία – αριθμητικές μέθοδοι (2η έκδοση)", Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-952-8  
[In Greek] Κωστόπουλος Σ.Δ. (2008),"Γεωτεχνικές Κατασκευές Ι (2η έκδοση)", Εκδόσεις Ίων, ISBN: 960-411-563-4  
[In Greek] Γεωργιάδης Κ., Γεωργιάδης Μ. (2009), "Στοιχεία Εδαφομηχανικής", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-157-5  
[In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0

### Deep Excavations and Earth Retaining Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ010 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Deep Excavations and Earth Retaining Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to: • To recognize the different types of Deep Excavations and Earth Retaining Structures. • Be able to perceive and evaluate soil and structure's parameters related to excavations. • To be able to desing and assess basic types of supports in simplified soil cases under simple and complex loading cases. • To propose and/or synthesize solutions based on the theories she/he has been taught for the most appropriate choice of support type, evaluating the requirements of the problem she/he faces each time. | |
| **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*  *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…*  *…….* |
| • Decision making  • Design of assignments  • Student individual project • Promotion of the free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Study, analysis and designing of various types of excavations and retaining walls. It includes the determination of the loading and the designing and construction configuration of the elements under study based on the modern regulations.  Content of theory lectures and practical exercises: • Presentation of excavation methods and types of retaining walls (flexible, with or without anchors, rigid, support systems, etc.) • Connection with soil mechanics (soil characteristics, horizontal soil stresses). • Methods for calculating earth pressures during the design of retaining walls (Rankine, Coulomb, regulatory framework based on EC7, etc.). • Study and designing of different types of retaining walls. • Addressing issues related to groundwater. • Special cases of retaining walls (diaphragm walls, reinforced or reinforced soil, use of geotextiles, etc.). |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Individual project aiming at better understanding the teaching concepts  2. Final written exam at the end of the semester (in Greek language) |

**ATTACHED BIBLIOGRAPHY**

[In Greek] Κωμοδρόμος Α.Μ. (2019),"Θεμελιώσεις, Αντιστηρίξεις: οριακή ισορροπία – αριθμητικές μέθοδοι (2η έκδοση)", Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-952-8  
[In Greek] Κωστόπουλος Σ.Δ. (2008), "Γεωτεχνικές Κατασκευές ΙΙ", Εκδόσεις Ίων, ISBN: 978-960-411-657-7  
[In Greek] Κωστόπουλος Σ.Δ. (2008), "Γεωτεχνικές Κατασκευές Ι (2η έκδοση)", Εκδόσεις Ίων, ISBN: 960-411-563-4  
[In Greek] Αναγνωστόπουλος Χ., Χατζηγώγος Θ., Αναστασιάδης Α., Πιτιλάκης Δ. (2012), "Θεμελιώσεις-Αντιστηρίξεις και Γεωτεχνικά Έργα", Εκδόσεις Αϊβάζης, Θεσσαλονίκη, ISBN: 978-960-549-000-3  
[In Greek] Γεωργιάδης Κ., Γεωργιάδης Μ. (2009), "Στοιχεία Εδαφομηχανικής", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-157-5

### Soil Dynamics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ011 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Soil Dynamics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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 aim of the course is the students to understand the basic concepts of the dynamic behavior of soil deposits and to be capable of assessing the seismic soil response at the ground surface taking into account site effects.  Upon completion of the course, the students will be able to:  • be familiar with, understand and assess the basic parameters of soil and seismic ground motion that are related to the seismic wave propagation.  • distinguish and be aware of the critical parameters of strong ground motion that are related to the damage of the physical and human environment (seismic ground shaking of buildings and other structures, seismic loading of networks, soil liquefaction, landslides etc.) • evaluate the seismic ground motion at the ground surface of a soil deposit for a given time history at the seismic bedrock • compose solutions through theories that they have learnt using the current design framework | |
| **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*  *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…*  *…….* |
| • Decision making  • Design of assignments  • student individual project • promotion of the free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| Study of site effects on the propagation of seismic ground motion from the seismic bedrock up to the ground surface. Distinction and assessment of the main parameters of strong ground motion and detection of unfavorable conditions that may take place due to the soil behavior during an earthquake. Assessment and consideration of the above based on the current design framework.  Contents of the theory lectures and application exercises:  • Connection with technical seismology and revision of basic concepts of seismic mechanics (characteristics of earthquake disruption, ground motion prediction equations, parameters of seismic motion etc.)  • Deepening on the description and parameters of strong ground motion and assessment of the hazard of seismic events based on them (time histories, Fourier spectra, response spectra, duration of strong ground motion etc.)  • Introduction to site effects and on the concepts of soil dynamics  • Estimation of soil parameters that influence the dynamic response of soil deposit (in situ and laboratory methods, nonlinear soil behavior)  • Evaluation of seismic response of soil deposit. Theoretical approach and use of appropriate software for the estimation of soil response at the ground surface (linear behavior, equivalent linear behavior, nonlinear soil behavior)  • Consideration of seismic ground motion amplification due to site effects in current codes  • Microzonation studies.  • Specific situations of seismic soil behavior and their consideration according to the current codes (influence of 2D-3D phenomena, liquefaction, lateral spreading etc) Presentation of advanced calculation methods using finite element programs. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Individual project aiming at better understanding the teaching concepts  2. Final written exam at the end of the semester (in Greek language) |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Πιτιλάκης Κ. (2010), "Γεωτεχνική Σεισμική Μηχανική", Εκδόσεις Ζήτη, Θεσσαλονίκη, ISBN: 978-960-456-226-8  
• [In Greek] Γκαζέτας Γ. (1996), "Εδαφοδυναμική και σεισμική μηχανική", Εκδόσεις Συμεών, ISBN: 978-960-7346-44-0  
• Kramer S.L. (1996), "Geotechnical Earthquake Engineering", Prentice-Hall, ISBN: 978-0133749434

### Laboratory and Field Tests in Soil Mechanics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ012 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Laboratory and Field Tests in Soil Mechanics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Recognize, understand and evaluate the basic physical and mechanical properties of the soil.  • Distinguish the stages of performing laboratory experiments and in-situ soil testing.  • Perform basic soil mechanics laboratory tests.  • Determine which laboratory or field tests are appropriate (as well as combine individual tests) in order to estimate the required soil properties.  • Calculate soil parameters from test results and qualitatively assess the expected soil behavior. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search, analysis and synthesis of data and information  • Decision-making  • Working independently  • Project planning | |

**SYLLABUS**

|  |
| --- |
| Content of theory lectures and practical exercises:  • Relation to Soil Mechanics (soil characteristics, physical and mechanical soil properties).  • Common soil mechanics laboratory tests (theoretical presentation and laboratory applications)  • Presentation of tests and field research  • Specialized soil tests (determination of dynamic soil behavior properties, geophysical investigations)  • Monitoring soil behavior with instrumentation  • Code provisions – testing requirements – mandatory application cases. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises Written assignment (compulsory) which includes: • Processing and solving exercises-problems • Assessment of understanding key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Παπαχαρίσης Ν. Γραμματικόπουλος Ι., Ανδρεάδου-Μάνου Ν. (2015), "Γεωτεχνική Μηχανική: Έρευνα-Γεωτρήσεις-Εργαστήριο (3η έκδοση)", Εκδόσεις Κυριακίδη ΙΚΕ, ISBN: 978-618-5105-88-4  
• [In Greek] Κωστόπουλος Σ.Δ. (2005), "Πειραματική Γεωτεχνική Μηχανική", Εκδόσεις Ίων, ISBN: 978- 960-411-515-0  
• [In Greek] Αναγνωστόπουλος Α., Ανδρέου Π., Αναγνωστόπουλος Γ. (2014), "Εδαφικές Ιδιότητες από επί τόπου Δοκιμές", Εκδόσεις Συμεών, ISBN: 978-960-9400-49-7  
• [In Greek] Μαραγκός Χ.Ν. (2020), "Επιτόπου Δοκιμές στη Γεωτεχνική Μηχανική", Έκδοση Ν.Χ. Μαραγκός, ISBN: 978-618-84839-0-3**

### Special Topics in Highway Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ012 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Special Topics in Highway Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to recognize basic principles for the design of intersections and interchanges • Identify criteria for installing road restraint systems • Identify specifications and instructions for road work signs  • Design driveways and implement the access management principles • Cite road safety audit procedures • Use of computers in road design. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Working independently \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| The use of computers in road project design  • Digital terrain models  • Road projects design software  • Basics on junction design  • Road restraint systems  • Road work signs  • Driveways and access management  • Road safety audit procedures. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 48 | | Practice/exercises | 30 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises) OR  Final written exam (70%) + Optional individual assignment (30%).   The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• [in Greek] Αποστολέρης, Α.Κ. (2015). Οδοποιία Ι – Χαράξεις και Υπολογισμός Χωματισμός, Θεωρία και Πρακτική. Αναστάσιος Κ. Αποστολέρης, ΑΠΟΣΤΟΛΕΡΗΣ ΚΑΙ ΣΙΑ Ο.Ε., ISBN: 9789609371735.  
• [in Greek] Μουρατίδης, Α.Κ. (2008). Οδοποιία, Η Διαχείριση των Οδικών Έργων. University Studio Press, ISBN: 978-960-12-1759-8.  
• [in Greek] Natzschka, H. (2014). Οδοποιία: Σχεδιασμός και Κατασκευή. ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, ISBN: 978-960-461-583-4.  
• [in Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 1: Λειτουργική Κατάταξη Οδικού Δικτύου (ΟΜΟΕ- ΛΚΟΔ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.  
• [in Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 2: Διατομές (ΟΜΟΕ-Δ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.  
• [in Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 3: Χαράξεις (ΟΜΟΕ-Χ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.  
• [in Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 5: Πρόσθετες Λωρίδες Κυκλοφορίας (ΟΜΟΕ-ΠΛΚ), ΥΠΕΧΩΔΕ, ΓΓΔΕ/ΔΜΕΟ, Έκδοση: 30/01/2001.  
• [in Greek] Οδηγίες Μελετών Οδικών Έργων, Τεύχος 7: Σήμανση Εκτελούμενων Έργων σε Οδούς (ΟΜΟΕ – ΣΕΕΟ), Υπουργείο Υποδομών, Μεταφορών και Δικτύων, 2010.  
• [in Greek] Οδηγίες Μελετών Οδικών Έργων, Συστήματα Αναχαίτισης Οχημάτων (ΟΜΟΕ – ΣΑΟ), Υπουργείο Υποδομών Μεταφορών, 2019.  
• American Association of State Highway and Transportation Officials (AASHTO) (2018). A Policy on Geometric Design of Highways and Streets. 7th Edition, AASHTO, ISBN-13: 978- 1560516767.  
• CALTRANS (2020). Highway Design Manual. 7th Edition, California Department of Transportation.  
• U.S. Department of Transportation, Federal Highway Administration (2006). FHWA Road Safety Audit Guidelines. FHWA-SA-06-06.  
• U.S. Department of Transportation, Federal Highway Administration (2000). ROUNDABOUTS: An Informational Guide. FHWA-RD-00-067.

### Road Operation and Traffic Management

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ013 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Road Operation and Traffic Management | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to define concepts in road operation and traffic management,  • Traffic operations and road maintenance,  • Intelligent Transport Systems,  • Traffic Management Centers.  • To analyze, schedule and deal with issues concerning traffic congestion, incidents, special events, demand, and parking.  • To recognize the procedures of inspection and maintenance of the road network with technical and economic data. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new conditions \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Road operations and traffic management • Traffic operations and road maintenance  • Institutional framework in Greece • Intelligent Transport Systems • Traffic Management Centers • Congestion management  • Incident management • Special events management • Demand management • Parking management • Inspections and maintenance, procedures, types, indexes, intervention planning • Economic methods of road and traffic management. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lectures Presentation using laptop and video projector or remotely, e-lecture if required. Learning process support through the electronic e-learning platform. Distance meetings between for collaboration beyond class (via a digital platform, e.g. ZOOM, Skype). Posting announcements on the Department's website and on the online page of the course within the electronic e-learning platform. Teacher and student communication via email. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises) OR  Final written exam (70%) + Optional individual assignment (30%).   The evaluation criteria are communicated to the students in the first lecture of the course. Also, each student is given the opportunity to check their graded sheet and have their performance analyzed. |

**ATTACHED BIBLIOGRAPHY**

-Mouratidis, A.K. (2008). Road Construction, Road Projects Management. University Studio Press, ISBN: 978-960-12-1759-8 [In Greek].  
-Franzeskakis, I.M., Golias, I.K., Pichiava-Latinopoulou, M.H. (2009). Traffic Engineering. Ed.PAPASOTIRIOU co, ISBN: 978-960-7182-42-5 [In Greek].  
-Franzeskakis, I.M., Pitsiava-Latinopoulou, M.H., Tsamboulas, D.A. (2002). Traffic Management. Ed. PAPASOTIRIOU co, ISBN: 978-960-7510-50-1 [In Greek].  
-Roess, R.P., Prassas, E.S. (2014). The Highway Capacity Manual: A Conceptual and Research History. HEAL-Link Springer ebooks, ISBN: 978-3-319-05786-6.

### Road Safety

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ014 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Road Safety | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to define procedures for road safety evaluation in urban and interurban road network, as well as methods of increasing level of road safety, to evaluate the effectiveness of road safety measures and the economic impact of road accidents. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Introduction to road safety, road safety statistics,  • Data collection and data bases  • Road safety management  • Road safety studies  • Identification of black spots  • Road safety and the users, the road and the vehicles  • Influencing user behavior, education, safety campaigns, and theoretical models for behavioral change  • Experimental methods in behavioral changing analysis  • Economic impact of road accidents  • Classification and evaluation of road safety measures  • Prediction of road accidents in urban and interurban road network  • Reduction of road accidents in road segments and junctions. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises) OR  Final written exam (70%) + Optional individual assignment (30%).   The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• **[in Greek] Κώδικας Οδικής Κυκλοφορίας (Κ.Ο.Κ.), Υπουργείο Μεταφορών Επικοινωνιών, Αθήνα, 2009, ISBN: 978-960-337-071-0.  
• [in Greek] Παυλίδης, Θ.Π. (2004). Η συμβολή του ανθρώπου στην οδική ασφάλεια. Ζήτη Πελαγία Σια Ι.Κ.Ε., ISBN: 960-431-939-6.  
• [in Greek] Φραντζεσκάκης, Ι.Μ., Γκόλιας, Ι.Κ. (1994). Οδική ασφάλεια. Α. ΠΑΠΑΣΩΤΗΡΙΟΥ ΣΙΑ Ι.Κ.Ε., ISBN: 978-960-7510-06-8.  
• Highway Safety Manual (HSM), American Association of State Highway Transportation Officials (AASHTO), 2010.**

### Environmental Impact Assessment Studies for Transport

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ015 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Environmental Impact Assessment Studies for Transport | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to  • Recognize the institutional framework for the protection of the environment in Greece and the stages of environmental impact assessment studies execution of transport infrastructure systems,  • Recognise the basic units of road construction environmental impacts,  • Address issues in road traffic noise and vibrations, air pollution, aesthetic pollution, anti-pollution measures and environmental monitoring programs. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| • Institutional framework for the protection of the environment in Greece  • Execution stages for environmental impact assessment studies for road transportation projects • Basic evaluation sections for environmental assessment and impacts for road transportation projects  • Land uses, natural and human ecosystems  • Road traffic noise and vibrations  • Measurement and evaluation of continuous noise level from road operation  • Methods of road traffic noise prediction and evaluation (construction – operation phases)  • Anti-noise barriers  • Air pollution, air pollutants from road traffic  • Emission, pollution concentration, pollution dispersion and parameters  • Road traffic noise and air pollution monitoring systems  • Metrological equipment for acoustic measurements. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises) OR  Final written exam (70%) + Optional individual assignment (30%).   The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

Vogiatzis, K. (2014). Environmental Policy and Implementation Framework. Simmetria Editions, ISBN 978-960-266-390-5 [in Greek].  
Tzika-Chatzopoulou, A., Chaikali, S., Vogiatzis, K. (2010). Protection of the Greek Acoustic Landscape. Papasotiriou Editions, ISBN: 978-960-7182-56-2 [in Greek].

### Water Resources and Flood Risk Management

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ009 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Water Resources and Flood Risk Management | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to:  • Gain a deep understanding of the fundamental concepts of water resources management.  • Comprehend and infer the natural processes of flood phenomena and methods for quantifying their characteristics.  • Calculate the hydrological design of water resources utilization projects.  • Analyze and solve a multi-purpose hydro-system management problem.  • Formulate and solve optimization problems of water distribution systems using classical and evolutionary algorithms.  • Evaluate, assess, and manage flood risk. | |
| **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*  *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…*  *…….* |
| 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**

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| --- |
| Course Description:  The course aims to provide students with the necessary theoretical background for the course 'ΥΔΡ009 Water Resources and Flood Risk Management'. It includes the essential material for understanding: (a) the principles of water resources management within the framework of sustainable development, (b) computational methods and analysis tools that support the design and optimal operation of hydro-systems under uncertainty, and (c) computational and analytical techniques and methodologies for the estimation and management of flood risk. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 36 | | Practice/exercises | 16 | | Project(s) | 10 | | Educational visit |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek Written Examination with Extended Response Questions (Formative and/or Conclusive) Theory Assessment (80% of the final grade): • Written progress exam (20% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises • Final written exam (60% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises Individual assignment (20% of the final grade) 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. The outline is communicated orally to the students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Κουτσογιάννης Δημήτριος, Ξανθόπουλος Θεμιστοκλής, Τεχνική Υδρολογία, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", ISBN: 978-960-603-506-7. Κωδικός Βιβλίου στον Εύδοξο: 59390290  
• [In Greek] Μπαλτάς Ευάγγελος, Μιμίκου Μαρία, Τεχνική Υδρολογία, Εκδόσεις Παπασωτηρίου, 2018 (6η έκδοση), ISBN: 978-960-491-125-7. Κωδικός Βιβλίου στον Εύδοξο: 77117411  
• [In Greek] Τσακίρης Γ., Υδατικοί πόροι : I Τεχνική υδρολογία και διαχείρηση των υδατικών πόρων, Εκδόσεις ΣΥΜΜΕΤΡΙΑ, 2012 (1η έκδοση), ISBN: 978-960-266-380-6. Κωδικός Βιβλίου στον Εύδοξο: 22771790  
• [In Greek] Μιμίκου Μαρία Α., Τεχνολογία Υδατικών Πόρων, Εκδόσεις Παπασωτηρίου, 2006, ISBN: 978- 960-7530-79-0. Κωδικός Βιβλίου στον Εύδοξο: 9780  
• [In Greek] Ευθύμης Λέκκας, Φυσικές Τεχνολογικές Καταστροφές, 2000 (Β έκδοση). Κωδικός Βιβλίου στον Εύδοξο: 7632457  
• [In Greek] Καλλία - Αντωνίου Αγγελική, Θεσμικό Πλαίσιο για την Προστασία και Διαχείριση Υδατικών Πόρων, Εκδόσεις Ζήτη, 2011, ISBN: 978-960-456-285-5. Κωδικός Βιβλίου στον Εύδοξο: 12718796**

### Renewable Energy Sources (geothermal, hydroelectric works)

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ010 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Renewable Energy Sources (geothermal, hydroelectric works) | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • understand the basic principles of energy technologies and energy mix, and determine the energy balance  • identify and estimate geothermal energy potential  • calculate hydraulic losses of hydroelectric projects  • plan the general layout and siting of hydroelectric projects  • compose technical-economic reports/studies and explain the performance of geothermal energy exploitation systems  • evaluate the performance and functionality of small and large hydroelectric projects | |
| **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*  *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…*  *…….* |
| • Research, analysis and synthesis of data and information • Adaptation to new situations • Decision making • Individual work • Work in an interdisciplinary environment • Project planning and management • Respect for the natural environment • Promotion of free, creative, and inductive thinking | |

**SYLLABUS**

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| --- |
| The course aims to provide students with the basic theoretical background for the course 'ΥΔΡ010 Renewable energy sources (geothermal, hydroelectric projects)'. It includes the necessary material for understanding: (a) the existence of geothermal energy sources as well as the calculation of the required technical infrastructure for their utilization and (b) the preliminary design of small and large hydroelectric projects.  Content of lectures:  • Energy. Basic principles of energy technologies. Energy mix. Renewable energy sources. Electricity balance. Temporal variation of consumptions. Energy production distinction.  • Introduction to geothermal terminology. Heat sources inside the Earth. Types of geothermal fields and potential uses. Advantages and disadvantages.  • Hydrothermal deterioration. Sampling of geothermal fluids. Stages of geothermal research.  • Usage of geothermal energy. High and low enthalpy geothermal energy (production of fluids and energy, networks, impact). Technical problems in the exploitation of geothermal energy.  • Financial – Technical elements of geothermal applications. Utilization of geothermal energy in Greece. Locating and evaluating geothermal energy sources.  • Principles and fundamentals of hydroelectric technology. Hydraulic losses. Types of turbines and their mechanical characteristics. Hydroelectric projects (water intakes, intake pipes, generating stations, escape pipes, spillways, gate barriers).  • Preliminary design of large hydroelectric projects (general layout, technical parameters, environmental issues, operation, and optimization).  • Small hydroelectric projects (technology, design, water abstractions, pipelines, reservoirs, environmental issues, hydrological planning). |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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 e-learning. Teacher-student collaboration time either in person or via teleconference. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 36 | | Practice/exercises | 16 | | Project(s) | 10 | | Educational visit |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek Written Examination with Extended Response Questions (Formative and/or Conclusive) Theory Assessment (80% of the final grade): • Written progress exam (20% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises • Final written exam (60% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises Individual work (20% of the final grade) 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. The outline is communicated orally to the students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• **Phytikas, M., Andritsos N., Geothermal Energy, TZIOLA Publications, 2004, ISBN: 978-960-418-019-6. Book Code in Eudoxos: 18549096 [in Greek].
  
• Karydakis G., GEOTHERMAL ENERGY, ATHLOTYPO Publications, 2005, ISBN: 960-7378-65-2. Book Code in Eudoxos: 2621 [in Greek].
  
• Vrachopoulos M., NORMAL GEOTHERMAL - PRINCIPLES OF GEOTHERMAL SYSTEM DESIGN AND APPLICATIONS, Publications Greek Academic Electronic Books and Aids - "Kallipos" Repository, 2016, ISBN: 978-960-603-270-7. Book Code in Eudoxos: 320348 [in Greek].
  
• Papantonis D., Small hydroelectric projects, Tsotras Publications, 2016, ISBN: 978-618-5066-46-8. Book Code in Eudoxos: 50661021 [in Greek].
  
• Koutsoyiannis D., Xanthopoulos Th., Technical Hydrology, Publications Greek Academic Electronic Books and Aids - "Kallipos" Repository, ISBN: 978-960-603-506-7. Book Code in Eudoxos: 59390290 [in Greek].**

### Wave Mechanics and Offshore Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ011 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Wave Mechanics and Offshore Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| 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. | |
| **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*  *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…*  *…….* |
| 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**

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| --- |
| 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**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 36 | | Practice/exercises | 16 | | Project(s) | 10 | | Educational visit |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek Written Examination with Extended Response Questions (Formative and/or Conclusive) Theory Assessment (80% of the final grade): • Written progress exam (20% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises • Final written exam (60% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises Individual assignment (20% of the final grade) 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. The outline is communicated orally to the students during the first lecture. |

**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.  
• [In Greek] Κρεστενίτης Ιωάννης, Κομπιάδου Κατερίνα, Μακρής Χρήστος, Ανδουλιδάκης Γιάννης, Καραμπάς Θεοφάνης, ΠΑΡΑΚΤΙΑ ΜΗΧΑΝΙΚΗ - ΘΑΛΑΣΣΙΑ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΥΔΡΑΥΛΙΚΗ, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016 (1η έκδοση), ISBN: 978-960-603-253-0. Κωδικός Βιβλίου στον Εύδοξο: 320173.  
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• Dean R.G., Dalrymple R.A., Water Wave Mechanics for Engineers and Scientists, World Scientific, ΙSBN 978-981-02-0420-4, 1991.  
• Chakrabarti Subrata K., Handbook of Offshore Engineering, Elsevier Ltd., ΙSBN 978-0-08- 044381-2, 2005.

### Environmental Hydraulics

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ012 | **SEMESTER** | | 8th | |
| **COURSE TITLE** | Environmental Hydraulics | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to:  • Identify mathematical and analytical computational methods applied to hydraulic environment.  • Understand pollutant transport processes in hydro-systems and mathematical models of pollution.  • Examine wastewater dilution (in time and space) under various aquatic environmental conditions.  • Calculate pollutant concentration dispersed in a river, taking into account hydraulic interactions and processes.  • Explain turbulent mixing phenomena using dimensional analysis.  • Evaluate and design wastewater disposal projects in the sea. | |
| **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*  *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…*  *…….* |
| 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**

|  |
| --- |
| Course Description:  The course aims to provide students with the necessary theoretical background for the course 'ΥΔΡ012 Environmental Hydraulics'. It includes the essential material for understanding: (a) pollutant transport processes in hydro-systems, (b) hydraulic calculations of underwater sewage conduits, and (c) the description of turbulent diffusion in rivers and coastal areas. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 36 | | Practice/exercises | 16 | | Project(s) | 10 | | Individual study | 68 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek Written Examination with Extended Response Questions (Formative and/or Conclusive) Theory Assessment (80% of the final grade): • Written progress exam (20% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises • Final written exam (60% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises Individual assignment (20% of the final grade) 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. The outline is communicated orally to the students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Κωτσοβίνος Νικόλαος, Αγγελίδης Παναγιώτης, Υδραυλική Περιβάλλοντος, Εκδόσεις ΣΠΑΝΙΔΗ, 2008, ISBN: 978-960-6653-27-8. Κωδικός Βιβλίου στον Εύδοξο: 845  
• [In Greek] Ι.Δ.Δημητρίου, Δ.Ι.Δημητρίου, ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΥΔΡΑΥΛΙΚΗ, Εκδόσεις fountas, 2009, ISBN: 978960330675-7. Κωδικός Βιβλίου στον Εύδοξο: 4320  
• [In Greek] Κρεστενίτης Ιωάννης, Κομπιάδου Κατερίνα, Μακρής Χρήστος, Ανδουλιδάκης Γιάννης,Καραμπάς Θεοφάνης, ΠΑΡΑΚΤΙΑ ΜΗΧΑΝΙΚΗ - ΘΑΛΑΣΣΙΑ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΥΔΡΑΥΛΙΚΗ, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016 (1η έκδοση), ISBN: 978-960-603-253-0. Κωδικός Βιβλίου στον Εύδοξο: 320173  
• [In Greek] Γκανούλης Ιάκωβος Γ., Υδραυλική περιβάλλοντος, Εκδόσεις Παρατηρητής, 1984, ISBN: 978- 960-260-072-6. Κωδικός Βιβλίου στον Εύδοξο: 15191  
• [In Greek] Καραμπάς Θεοφάνης, Κρεστενίτης Ιωάννης, Κουτίτας Χριστόφορος, Ακτομηχανική – Έργα Προστασία Ακτών, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2015, ISBN: 978-960-603-378-0

### Coastal and Harbor Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ013 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Coastal and Harbor Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: • identify and describe marine hydraulic processes in the coastal area, • estimate wave propagation at the coastal front and distinguish wave processes in the coastal area • calculate the wave loadings on a vertical front and breakwaters with slopes and dimension these constructions | |
| **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*  *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…*  *…….* |
| 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 core course 'YDR013 Coastal Engineering and Port Works'. Includes the necessary material for the understanding of: (a) the characteristics of marine hydraulic flow in a coastal area, (b) the complex phenomenon of coastal morphodynamics and the effect on coastal mechanics and (c) of the design of coastal and port projects. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 36 | | Practice/exercises | 16 | | Project(s) | 10 | | Educational visit |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek Written Examination with Extended Response Questions (Formative and/or Conclusive) Theory Assessment (80% of the final grade): • Written progress exam (20% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises • Final written exam (60% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises Individual assignment (20% of the final grade) 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. The outline is communicated orally to the students during the first lecture. |

**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] Κουτίτας Χριστόφορος, Εισαγωγή στην παράκτια τεχνική και τα λιμενικά έργα, Εκδόσεις Ζήτη, 1994, ISBN: 960-431-289-8. Κωδικός Βιβλίου στον Εύδοξο: 11264  
• [In Greek] Κρεστενίτης Ιωάννης, Κομπιάδου Κατερίνα, Μακρής Χρήστος, Ανδουλιδάκης Γιάννης, Καραμπάς Θεοφάνης, ΠΑΡΑΚΤΙΑ ΜΗΧΑΝΙΚΗ - ΘΑΛΑΣΣΙΑ ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΥΔΡΑΥΛΙΚΗ, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016 (1η έκδοση), ISBN: 978-960-603-253-0. Κωδικός Βιβλίου στον Εύδοξο: 320173  
• [In Greek] Καραμπάς Θεοφάνης, Κρεστενίτης Ιωάννης, Κουτίτας Χριστόφορος, Ακτομηχανική – Έργα Προστασία Ακτών, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2015, ISBN: 978-960-603-378-0

### Cοnstruction Site and Machinery Management

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ017 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Cοnstruction Site and Machinery Management | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Scientific Field | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing this course students should be able to recognize and propose use of different types of construction machinery, to prepare construction site management plans, accurate takeoffs, productivity estimates as well as construction site safety plans. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Introduction to Construction Site and Machinery Management. Construction machinery (types of machinery, heavy equipment, cost and maintenance). Measured drawings and methods for as-built project costs, designing and dimensioning construction site layouts. Construction site organization. Legislative framework. Construction site safety plans, construction safety engineer. Main concepts and examples: Loader-truck combination, conveyor-belt system, calculation diagrams - Excavator-bulldozer combination. Rapid calculation methodology for performance evaluation - Cost estimation. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 39 | | Practice/exercises | 13 | | Project(s) | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises) OR  Final written exam (70%) + Optional individual assignment (30%).   The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• **[in Greek] Παντουβάκης, Π. Λαμπρόπουλος, Σ. (2012), Οργάνωση Εργοταξίων, Αθήνα, ISBN 978-960- 93-4005-2.  
• [in Greek] Πολύζος Σερ. (2011), Διοίκηση Διαχείριση των Έργων [Νέα αναθεωρημένη Έκδοση], Εκδόσεις Κριτική.  
• [in Greek] Πετροτσάτου Κ. Μαρινέλλη Μ. (2018), Δομικές μηχανές, λειτουργική ανάλυση και κοστολόγηση έργων Πολιτικού Μηχανικού, Εκδόσεις Κριτική, ISBN: 9789605862534.**

### Retrofitting and Strengthening of Existing Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ031 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Retrofitting and Strengthening of Existing Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/course/view.php?id=440 | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: 1. To recognize the forms of failure in existing constructions 2. To understand the concepts of intervention, repair, strengthening, valuation and vulnerability of structures 3. To be able to choose the appropriate intervention strategy (materials/techniques) for an existing structure 4. To assess the load-bearing capacity of reinforced concrete structural elements 5. To use the Regulation of Interventions (KAN.EPE.) for the assessment of an existing structure and the selection of an appropriate intervention | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Introduction to the concepts of assessment and vulnerability of structures  • Strategies and design for seismic retrofit of buildings  • Overview of regulatory provisions and guidelines relating to interventions and strengthening of structures. Introduction to KAN.EPE. and Eurocode 8-3  • Estimation of the load-bearing capacity of Reinforced Concrete structural elements  • Materials and techniques for repair/strengthening (RC jackets, FRP etc.)  • Introduction to inelastic methods of analysis of structures |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 20 | | Individual study | 58 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught (30%). 2. Final written exam (in Greek) at the end of the semester (70%). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Dritsos S., Repair and Strengthening of Reinforced Concrete Structures, 3rd ed., Patra, 2005 (in Greek)  
Spyrakos K., Strengthening of Structures for Seismic Loads, TCG, 2004 (in Greek)  
CEN, Eurocode 8: Design of structures for earthquake resistance Part 3: Assessment and retrofitting of buildings, 2005

### Bridge Engineering - Road Construction Works

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ032 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Bridge Engineering - Road Construction Works | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students are expected to: 1. Understand the basic principles governing the structural system, the formation of the superstructure and the foundation of bridges 2. Be familiar with the regulatory framework for bridge design 3. Know the types of bridges and their application field 4. Calculate the design actions for road bridges according to the Eurocodes (traffic loads, wind loads, seismic actions, etc.). 5. Model, analyze and dimension bridge piers and decks 6. Be able to design small-scale engineering works such as culverts, retaining structures, etc. | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Introduction to bridge engineering. Types of bridges. Construction methods  • Elements of bridges. Abutments. Superstructure. Joints and bearings. Bridge foundations.  • Design actions for road bridges in accordance with the Eurocodes. Seismic behavior of bridges. Basic design principles against earthquakes.  • Design of bridge abutments (modeling, analysis, and dimensioning)  • Design of bridge superstructures (modeling, analysis, and dimensioning)  • Design of small engineering structures, culverts, retaining works, etc. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Project(s) | 20 | | Individual study | 58 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Tegos I., Brigdes 2nd ed., Tsiartsianis publ., 2007 (in Greek)  
Leonhardt F, Mönnig E. Vorlesungen über Massivbau—Teil 2: Sonderfälle der Bemessung im Stahlbetonbau. Dritte Auflage. Berlin Heidelberg: Springer; 1986.  
Ermopoulos I., Steel and Composite Bridges, Kleidarithmos publ., 2000 (in Greek)

### Elastoplastic Analysis of Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ033 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Elastoplastic Analysis of Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: 1. understand the basic principles of the plastic behavior of truss structures 2. formulate and solve an elastoplastic loading problem of a medium and calculate stresses and strains 3. select a yield criterion depending on the structural material, 4. analyze collapse mechanisms in truss structures 5. determine manually or using computational tools the collapse load of frames | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Elastic - elastoplastic analysis. Redistribution of forces. Ductility.  • Pure plastic bending. Bending with axial force. Interaction surfaces. Unloading. Influence of shear.  • Step by step elastoplastic analysis of statically determinate and indeterminate structures. Displacements.  • Application of the Principle of Virtual Work in elastoplastic analysis. Distribution of moments. Kinematically admissible mechanisms.  • Plastic limit analysis.  • Loads and collapse mechanisms of simple and frame structures.  • Concentrated - Distributed Plasticity. Yield criteria. Nonlinear analysis.  • Dynamic plastic analysis. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Papadrakakis M., Statics Courses - Plastic Analysis of Truss Structures, Tsotras publ., 2013, ISBN 978-618-5066-02-4 (in Greek)  
Jagabanduhu Chakrabarty: “Theory of Plasticity”, 3rd Edition, Butterworth-Heinemann, 2006, ISBN: 9780750666381"

### Bioclimatic Architectural Design

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ034 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Bioclimatic Architectural Design | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/ | | | | |

**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* | |
| Upon successful completion of the course, each student is expected to be able to: • Understand the basic concepts and strategies of energy-efficient design for buildings and describe relevant topics using the corresponding terminology. • Distinguish, comprehend, and apply the principles of bioclimatic architecture and the fundamental design methodologies for passive buildings. • Analyze the characteristics of a conventional building with the aim of its upgrading, evaluate options for integrating passive systems into it, such as: interventions in the building envelope (insulation, openings, roof), transformations of the layout, adoption of sustainable materials, environmental interventions. Propose smaller or larger-scale interventions in a well-documented way, towards upgrading. • Create and compose, from the initial stage to a design level of scales 1:100-1:50, a small-scale building (residence) using the tools, techniques, and methods of energy-efficient design for buildings, while considering the surrounding area of the building as well. Prerequisites for the course include knowledge of design principles (Drawing and Computer Aided Design (CAD)) and minimum prior experience in architectural design (covered by the Department's Curriculum). | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_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 interdisciplinary environment  \_Project planning and management \_Respect for the natural environment \_Criticism and self-criticism \_Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| The course introduces students to energy-efficient design for buildings, with an emphasis on the ‘passive building’ and the implementation of soft technology applications within the context of sustainability for contemporary building constructions. The aim is for students to acquire knowledge on the basic theory of bioclimatic architectural design and the upgrading of conventional buildings, thus gradually become capable of designing bioclimatic building structures themselves using all the design methodology provided. Additionally, be able to make corrective interventions (upgrades) to existing buildings towards the same direction (low environmental impact, resource efficiency, sustainability). The course includes theoretical lectures and exercises (practice), short or extensive assignments that promote creative thinking (analysis synthesis) as well as design projects; all fostering active student participation in the course. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures |  | | Practice/exercises |  | | Project(s) | 38 | | Individual study | 40 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | The final evaluation is composed of marks collected from different parts of the teaching process, as follows: Α. Written examination (theory part, end of semester): 50% of the final grade Β. Examination by design (design part, end of semester): 20% of the final grade C. Quality of exercises, assignments and design projects developed during the semester participation in the course procedures (i.e. oral participation, meeting deadlines for handing in work): 30% of the final grade. The evaluation criteria are listed in the introductory handout of the course, which is posted on the e-learning platform in the beginning of the semester and is also distributed and presented to the students during the 1st class meeting. |

**ATTACHED BIBLIOGRAPHY**

\_Andreadaki – Chronaki, Eleni, 2017. Bioclimatic Design: Climate Change – Environment – Sustainability (2nd edition). Thessaloniki: University Studio Press Editions [in Greek].  
\_Papadopoulos, Michalis Axarli, Cleo, 2015. Building Physics and Passive Solar Energy Building Systems. Thessaloniki: Kyriakidis Editions [in Greek].  
\_Papamanolis, Nikolaos, 2015. Building physics and principles of buildings environmental design. [e-book] Athens: Association of Greek Academic Libraries (Kallipos). Available at: http://hdl.handle.net/11419/5407 [in Greek].

### Building Documentation, Rehabilitation and Reuse.

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ035 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Building Documentation, Rehabilitation and Reuse. | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr/ | | | | |

**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* | |
| Upon completing this course students should be able to describe main contemporary trends concerning the restoration and reuse of buildings, to recognize and analyze past construction activities, to select and implement, based on evidence, the optimal methodology for building and architectural documentation, manage a range of theories and methods for the documentation, pathology and representation of the original form, to be capable of applying (creating, designing) these representations in an evidenced and scientifically sound manner, to evaluate on-site studies, as well as documentation and pathology representations, with the aim of selecting and proposing evidence-based reuse solutions that are compatible with the identity and history of the building and the unique features of the surrounding area, to prepare all required technical reports and presentations, to collaborate and contribute as a member of multidisciplinary team in the preparation of comprehensive reports and presentations on the documentation, restoration, and reuse of buildings | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: - 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 interdisciplinary environment  - Project planning and management  - Respect for the natural environment  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| This is an introductory course on current theories and methods for studying historical buildings and architectural complexes, with the aim of developing critical thinking in decision-making regarding their management. Special emphasis is given to the method of Architectural Documentation as a means of recording and documenting existing structures for restoration and reuse purposes.  Lectures: Main concepts, definitions, terminology, general principles, legislation, scientific ethics regarding interventions in preserved and non-preserved structures, the concept and significance of monuments and their surrounding environment, contemporary perspectives and examples of interventions in buildings with heritage value. Focus on implemented studies of restoration and reuse of buildings and architectural complexes.  Project: Theories and methods for approaching buildings and architectural complexes requiring documentation and restoration. Analysis of information retrieval methods through literature and on-site research. Architectural documentation methodologies depending on the object of study. Field exercise applying the aforementioned recording and documentation methodologies for buildings. Creation of pathology, typology, phase analysis and drawings of the buildings. Evaluation of information and drawings for the restoration of the buildings. Proposals for reuse in line with contemporary restoration theories. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, CAD software (AutoCAD), e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures |  | | Practice/exercises |  | | Project(s) |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 on theory (50%) - Design examination (20%) - Project (assignments) (30%) |

**ATTACHED BIBLIOGRAPHY**

[In Greek]. Καραδέδος, Γ., Ιστορία και Θεωρία της Αποκατάστασης, Θεσσαλονίκη 2009.  
[In Greek]. Νομικός, Μ., Αποκατάσταση - Επανάχρηση Ιστορικών Κτιρίων και Συνόλων, Θεσσαλονίκη, 1997.  
[In Greek]. Καραμάνου, Ζ., Αποκατάσταση Επανάχρηση Κτιρίων και Συνόλων. Αναβάθμιση Προβληματικών Οικιστικών Περιοχών, Θεσσαλονίκη 1997

### Composite Constructions

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΟΜ036 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Composite Constructions | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to: - Understand the behavior of composite structures. - Be familiar with the behavior of elements and members made of different structural materials. - Calculate the combined ultimate limit state of steel and concrete in composite structures. - Design 3 dimensional composite structures - Distinguish between analysis methods and construction stages of composite structures. - Calculate, check and dimension beams, slabs and columns of composite structures according to Eurocode 4 | |
| **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*  *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…*  *…….* |
| - 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 interdisciplinary environment  - Project planning and management  - Criticism and self-criticism  - Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| • Formation of buildings with mixed structural elements, operating principles of elements made from different materials: structural steel - reinforced concrete.   • Specifications of construction materials according to Eurocode 4.  • Composite beams: Determination of inertia magnitudes, analysis methods for ultimate limit states of failure and serviceability.  • Composite slabs: Analysis and dimensioning. Construction details.  • Composite columns. Types, determination of inertia magnitudes, plastic intensity magnitudes, interaction of moments - axial forces, bending checks, construction details.  • Behaviour of composite structural elements against fire. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | 1. Assignment of tasks aimed at exploring the understanding of the concepts taught. 2. Final written exam at the end of the semester (in Greek). 3. Each student is given the opportunity to review their written exam and have their mistakes analyzed. |

**ATTACHED BIBLIOGRAPHY**

Vagias I., Composite Structures from Steel and Reinforced Concrete, 3rd ed., Kleidarithmos publ., 2010 (in Greek)

### Geotechnical Earthquake Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ013 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Geotechnical Earthquake Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Recognize, understand and evaluate the basic soil and structural parameters related to the seismic behavior of geotechnical constructions.  • Distinguish and comprehend various cases of seismic loading of geotechnical structures and calculate the respective stress and internal loading parameters.  • Study shallow foundations, pile foundations and retaining structures under seismic loading based on the existing code regulations.  • Synthesize solutions based on the knowledge acquired during the lessons, evaluate the requirements of the problem at hand, justify and support the proposed solutions and compare and choose the most appropriate approach between different alternatives. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search, analysis and synthesis of data and information, with the use of the necessary technology   • Decision-making  • Working independently   • Team work  • Working in an interdisciplinary environment   • Project planning | |

**SYLLABUS**

|  |
| --- |
| Study, analysis and design of geotechnical structures under seismic loading. Topics related to the seismic loading of soil, shallow foundations, pile foundations, retaining structures and other geotechnical constructions are examined, based on literature methods and the existing code regulations.    Content of theory lectures and application exercises:  • Soil characteristics and parameters during the soil dynamic response (based on experimental data, literature relationships and code provisions).  • Review of technical seismology and soil dynamics topics.  • Seismic design of shallow foundations.  • Seismic design of deep foundations (pile foundations).  • Seismic design of retaining structures.  • Seismic design of other geotechnical constructions (slopes, underground structures).  • Special cases of seismic soil loading - liquefaction. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises Written assignment (compulsory) which includes: • Processing and solving exercises-problems • Assessment of understanding key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Πιτιλάκης Κ. (2010), "Γεωτεχνική Σεισμική Μηχανική", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-226-8  
• Kramer S.L. (1996), "Geotechnical Earthquake Engineering", Prentice-Hall, ISBN: 978- 0133749434  
• [In Greek] Γκαζέτας Γ. (1996), "Εδαφοδυναμική και σεισμική μηχανική", Εκδόσεις Συμεών, ISBN: 978- 960-7346-44-0  
• [In Greek] Αναγνωστόπουλος Χ., Χατζηγώγος Θ., Αναστασιάδης Α., Πιτιλάκης Δ. (2012), "Θεμελιώσεις- Αντιστηρίξεις και Γεωτεχνικά Έργα", Εκδόσεις Αϊβάζης, Θεσσαλονίκη, ISBN: 978-960-549- 000-3  
• [In Greek] Γεωργιάδης Κ., Γεωργιάδης Μ. (2009), "Στοιχεία Εδαφομηχανικής", Εκδόσεις ΖΗΤΗ, Θεσσαλονίκη, ISBN: 978-960-456-157-5  
• [In Greek] Κωμοδρόμος Α.Μ. (2019),"Θεμελιώσεις, Αντιστηρίξεις: οριακή ισορροπία – αριθμητικές μέθοδοι (2η έκδοση)", Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-952-8  
• [In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0**

### Geotechnical Failures and Soil Improvement Methods

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ014 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Geotechnical Failures and Soil Improvement Methods | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Recognize, understand and describe the basic forms of geotechnical failures and their causes.  • Identify and comprehend the physical and mechanical geotechnical parameters associated with potential failure and requiring improvement.  • Distinguish and evaluate the mechanism of the resulting improvement for each soil strengthening method quantitatively assess the achieved improvement.  • Design and/or synthesize solutions based on the knowledge acquired during the lessons, and evaluate the particular requirements of the problem at hand, in order to achieve the optimal result of soil improvement. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search, analysis and synthesis of data and information, with the use of the necessary technology   • Decision-making  • Working independently   • Team work  • Working in an interdisciplinary environment   • Project planning | |

**SYLLABUS**

|  |
| --- |
| Study, analysis and design of measures for improving soils at risk of geotechnical failures. Issues related to soil failures (exceeding bearing capacity and/or settlements, liquefaction, etc.), slopes, underground structures, etc. are examined.    Content of theory lectures and application exercises:  • Basic characteristics and mechanical strength parameters of the soil.  • Presentation of basic types of geotechnical failures. Study of related soil properties, loading characteristics and causes leading to failure.  • Methods of improvement and strengthening soils under various risks (exceeding bearing capacity, exceeding settlements, soil liquefaction, landslides, slope failure, hydraulic excavation, etc.). Design, process, review of geotechnical parameters that are improved by each method.  • Detailed presentation and study of selected soil improvement methods based on literature methods and code provisions (soil compaction, soil replacement, soil reinforcement with grouting, micropiles, reinforced earth, geotextiles, soil preloading, drainage methods, gravel piles, etc.). Correlation with actual geotechnical failure cases addressed by each proposed improvement method.  • Monitoring the behavior of improved soils. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises Written assignment (compulsory) which includes: • Processing and solving exercises-problems • Assessment of understanding key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Κωστόπουλος Σ.Δ. (2008), "Γεωτεχνικές Κατασκευές ΙΙ", Εκδόσεις Ίων, ISBN: 978-960-411- 657-7
  
• [In Greek] Ρόζος Δ. (2008), " Βελτίωση γεωτεχνικής συμπεριφοράς γεωλογικών σχηματισμών", Ηλεκτρονικό σύγγραμμα (διάθεση δωρεάν)
  
• [In Greek] Χριστούλας Στ. (1998), "Επιλογές Εφαρμοσμένης Γεωτεχνικής Μηχανικής", Εκδόσεις Συμεών, ISBN: 978-960-7888-11-1
  
• [In Greek] Barnes G.E. (2014), "Εδαφομηχανική: Αρχές και Εφαρμογές (3η έκδοση)", Εκδόσεις Κλειδάριθμος, Αθήνα, ISBN: 978-960-461-578-0**

### Computational Geotechnical Engineering

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ015 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Computational Geotechnical Engineering | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Recognize and understand the use of numerical methods and computer software in the study of the behavior of geotechnical structures.  • Distinguish and evaluate the basic parameters that govern the problem at hand and understand how to simulate them using specialized software.  • Study simple cases of geotechnical structures using specialized computer software.  • Evaluate the analysis results. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search, analysis and synthesis of data and information, with the use of the necessary technology   • Decision-making  • Working independently   • Team work  • Working in an interdisciplinary environment   • Project planning | |

**SYLLABUS**

|  |
| --- |
| The study of soil behavior and geotechnical structures using computer aided analysis. Specialized computer software (free and academic use) is presented for the analysis and computation of foundations, retaining walls, slopes, etc. The determination of the internal forces/stresses, the calculation of loading and the simulation of each examined case study in the provided software are also part of the course. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises using specialized software Written assignment (compulsory) which includes: • Processing and solving exercises-problems using specialized software • Assessment of understanding key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Κωμοδρόμος Α.Μ. (2008), "Υπολογιστική Γεωτεχνική Μηχανική: Αλληλεπίδραση Εδάφους- Κατασκευών", Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-201-7**

### Dams and Earth Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ016 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Dams and Earth Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Recognize and understand the different types of dams and appreciate the importance of the required accompanying constructions.  • Evaluate the basic physical and mechanical parameters of soil materials and select those suitable for the construction of dams and related earth structures.  • Distinguish and evaluate the possible causes of failure in earth dams and propose solutions based on the knowledge acquired during the lectures.  • Conduct basic stability checks for the dam construction.  • Prescribe the fundamental parameters of the accompanying constructions for the proper operation of a dam.  • Propose an appropriate monitoring plan for assessing the dam behavior and evaluate the respective results. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search, analysis and synthesis of data and information, with the use of the necessary technology   • Decision-making  • Working independently   • Team work  • Working in an interdisciplinary environment   • Project planning | |

**SYLLABUS**

|  |
| --- |
| Study of various types of dams and accompanying soil constructions (e.g. slopes) based on the respective code provisions. Development of topics such as underground water flow, soil permeability, excavation problems and their mitigation.    Content of theory lectures and exercises:  • Introduction to the subject - necessity of dams and earthworks.  • Presentation of different types of dams and accompanying structures - basic principles of earth dam construction - physical characteristics of utilized soil materials.  • Soil permeability, groundwater flow, water flow networks.  • Study of earth dams and accompanying structures based on literature and code provisions.  • Problems and causes of failure in earth dams and their mitigation – presentation of historic cases. Monitoring the dam behavior with instrumentation. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises Written assignment (compulsory) which includes: • Processing and solving exercises-problems • Assessment of understanding key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Σαχπάζης Κ. (2018), "Γεωτεχνική Μηχανική των Φραγμάτων", Εκδόσεις Τσαπραΐλη Χρυσάνθη, ISBN: 978-618-83547-0-8  
• [In Greek] Τσόγκας Χ.Ε. (2018), "Υδροδυναμικά Έργα", Εκδόσεις ΖΗΤΗ, ISBN: 978-960-456-509-2  
• [In Greek] Μαραγκός Δ. (2000), "Τεχνικά Έργα Υποδομής (2η έκδοση)", Εκδόσεις Νικόλαος Μαραγκός, ISBN: 960-7834-00-3**

### Soil – Structure Interaction

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΓΕΩ017 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Soil – Structure Interaction | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, the student will be able to:  • Recognize and understand the concepts related to the phenomenon of soil - foundation - structure interaction.  • Distinguish and evaluate the basic key parameters and soil and structural behavior that influence the interaction phenomenon.  • Comprehend the effects of interaction on the structural behavior and dynamic response.  • Study the influence of interaction in simple cases of foundations or in complex soil-structure systems using specialized software. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills:  • Search, analysis and synthesis of data and information, with the use of the necessary technology   • Decision-making  • Working independently   • Team work  • Working in an interdisciplinary environment   • Project planning | |

**SYLLABUS**

|  |
| --- |
| Soil-foundation-structure interaction in above-ground and underground constructions. Concept of interaction under static and dynamic loading and examination of the phenomenon and effects of interaction in shallow foundations, embedded foundations, pile foundations and underground structures, based on state-of-the-art literature approaches and code provisions.    Content of theory lectures and application exercises:  • Introduction to soil – foundation – structure interaction. Case studies and examples.  • Soil and structural parameters affecting interaction under static and dynamic response.  • Foundation on compliant ground conditions - Winkler method.  • Pile-soil interaction under axial and lateral loading.  • Soil-structure interaction in underground constructions.  • Dynamic soil-foundation-structure interaction.  • Code provision related to the study interaction phenomena.  • Historical examples.  • Use of specialized software to employ for the simulation of interaction problems. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Lecture presentations using computer and projector, in person or by teleconference (remotely) if required. Support of the learning process through the e-learning platform and electronic communication with students (online announcements and comments, e-mail, announcements on the Department's website etc.). If required, support of students by using teleconference tools and software. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 26 | | Practice/exercises | 26 | | Practice/exercises | 30 | | Individual study | 48 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Written final examination including: • Theoretical knowledge and judgment questions on course subjects • Solving problems-exercises Written assignment (compulsory) which includes: • Processing and solving exercises-problems • Assessment of understanding key concepts of the course |

**ATTACHED BIBLIOGRAPHY**

• **[In Greek] Κωμοδρόμος Α.Μ. (2008), "Υπολογιστική Γεωτεχνική Μηχανική: Αλληλεπίδραση Εδάφους- Κατασκευών", Εκδόσεις Κλειδάριθμος, ISBN: 978-960-461-201-7
  
• [In Greek] Γκαζέτας Γ., Αναστασόπουλος Ι, Γαρίνη Ε., Γερόλυμος Ν. (2016), "Αλληλεπίδραση Εδάφους- Θεμελίου-Κατασκευής (2η έκδοση)", Εκδόσεις Τσότρας, ISBN: 978-618-5066-68-0
  
• Wolf J.P. (1986), "Dynamic Soil-Structure Interaction", Prentice-Hall, ISBN: 0132215659.**

### Design and Operation of Railway Transport Systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ016 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Design and Operation of Railway Transport Systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to collect data to design a railway transport system as well to define the level of service and safety provided and record the needs of an existing one  • To combine the previous data in order to define the parameters for the design or improvement of a railway transport system  • To implement the knowledge and data in order to calculate and design a new railway transport system and its components, to monitor, predict and manage the demand of an existing one  • To analyze components and operations that compose a railway transport system, clarify and classify them in terms of cost, quality and functional criteria. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Railway and its capabilities, the railway transport system and its historical evolution  • Power vehicles, diesel and electric traction,  • Wheel rail interaction  • Railway track elements • Railway track infrastructure • Railway track design • Railway technical projects, railway tunnels, railway bridges, embankments, trenches, drainage, noise barriers and fences • Railway facilities, traffic signaling, railway electrification system, railway level crossings, railway lines, switches and crossings • Rolling stock, design, construction and operation of rolling stock, derailment of railway vehicles • High-speed trains, tilting trains, urban and suburban railway systems, rack railway • Elements of technical railway operators, train traffic management and traffic capacity  • Elements of commercial rail operators, railway stations, organization and management of passenger and freight rail transport, mixed train traffic control and the effects in the design and operation of railway transport systems • Railway safety, European policy in rail transport, interoperability technical specifications. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises)  The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• Giannakos, K.S. (2002). Actions on the Railway. Papazisis Editions, ISBN: 978-960-02-1566-3 [in Greek].   
• Limperis, K. (2011). Railway Theory and Applications. Simmetria Editions, ISBN: 978-960-266-332-5 [in Greek].   
• Matsoukis E-G (2008). Transportations Design and the Railway Sciense Elements. Simmetria Editions, ISBN 978-960-266-230-4 [in Greek].   
• Profillidis, V. (2016). The Railway Science. Giahoudis Editions, ISBN 978-618-5092-22- 1 [in Greek].   
• Pirgidis, Ch. (2009). Railway Transport Systems. Ziti Pelagia Editions, ISBN: 978-960-456-155-1 [in Greek].   
• Marks-Fahrmann, U., Restetzki, K., Biehounek, A., Hegger, A. (2018). Railway Technology. Ion Editions, ISBN: 978-960-508-279-6 [in Greek].

### Design and Operation of Sea Transport Systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ018 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Design and Operation of Sea Transport Systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to recognize the basic principles and specifications for the design, organization and operation of sea transport systems  • To acquire knowledge for the strategic and operational design of sea ports, combined transport and multimodal transport chain, as well as new technologies and intelligent systems in shipping and maritime transport  • To acquire the ability to identify, analyze and interpret the necessary National, European and International legal framework. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Introduction to maritime systems  • European policy on maritime transport  • Maritime systems and technical terminology  • Cargo and sea transport mode  • Port organization characteristics: evolution and emerging trends  • Demand and supply for shipping services  • Port throughput, performance indicators and fares  • Feasibility studies in maritime systems  • Organization and management of ports and port facilities  • Quality and safety management in maritime transport  • Combined transport and multimodal transport chain  • Short sea shipping and Motorways of the Sea  • New technologies and intelligent systems in shipping and maritime transport. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises)  The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• Giannopoulos, G.A. (2005). Maritime Transport. Epikentro Editions. ISBN: 978-960- 6645-21-1 [in Greek].  
• Kostagiolas, P., Chlomoudis, K. (2011). Quality and Safety Management in Maritime Transport. Papazisis Editions, ISBN: 978-960-02-2568-6 [in Greek].  
• Pardali A. (2007). Ports economics and policies. Stamoulis Editions, ISBN: 978-960-351-689-7 [In Greek].  
• Profillidis, V. (2016). Transport Economics. Papasotiriou Editions, ISBN: 978-960-491-100-4 [in Greek].  
• Tsaltas, G. (2008). Environment and Maritime Transport. In search of a sustainable approach. ΑΝΔΡΕΑΣ ΣΙΔΕΡΗΣ-ΙΩΑΝΝΗΣ ΣΙΔΕΡΗΣ ΣΙΑ Ο.Ε. Editions, ISBN: 978-960-08-0459-1 [in Greek].   
• Lindgren, J. F., Brynolf, S., Wilewska-Bien, M., Andersson, K. (eds), (2016). Shipping and the Environment. Improving Environmental Performance in Marine Transportation. Springer Berlin, Heidelberg. ISBN 978-3-662-49043-3.

### Design and Operation of Air Transport Systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ019 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Design and Operation of Air Transport Systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to recognize the importance of air transport systems, national and international, as well as the procedures and systems necessary for their proper operation  • To recognize and implement principles of air transport systems design, and know the air and ground infrastructure of air transport systems  • To describe and implement elements of organization, management and administration of air transport systems  • To acquire the ability to identify, analyze and interpret the necessary National, European and International legal framework. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Introduction to design and operation of air transport systems,  • National and international air transport  • Freedoms of the Air, monopoly and competition, liberalization, airline alliances and privatization  • Organization and administration of airline companies and airports, financial data  • Main elements for the study and the design of air transport systems  • Aircrafts and airports, Air Traffic Management  • Airports: passenger terminals, freight terminals, airport access and safety  • Helipads, Water airports. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises)  The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

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• **Matsoukis, E. (2011). Airports. Simmetria Editions, ISBN: 978-960-266-399-4 [in Greek].   
• Nikolaidis, Ath. F. (2017). Airports. Design and Construction. ΙΚΑΝΙΚ Ι.Κ.Ε. Editions ISBN: 978- 960-91849-6-0 [in Greek].   
• Profillidis, V. (2010). Air Transport and Airports. Papasotiriou Editions, ISBN: 978-960-7182-71-5 [In Greek].  
• Ashford N.J. (2011). Airport Engineering: Planning, Design, and Development of 21st Century Airports. Wiley, HEAL-Link Wiley ebooks, ISBN: 9780470950074.**

### Transport policies

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ020 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Transport policies | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able  • to define the concept of transport policies,  • to recognize international practices and the characteristics of transport policies on a national and international level, as well as future prospects. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Formulation of transport policies  • European transport policies: a historical timeline  • European policies in Trans-European/Pan-European Transport Networks  • European policies for road, rail, air, maritime, and inland waterways transport  • Control and monitoring of the implementation of European transport policies  • International Organizations for policy making  • National transport policies. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises)  The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• Thematic bulletins on the European Union, Transport and Tourism Policy. https://www.europarl.europa.eu/factsheets/el/section/198 [In Greek].   
• European Union, Policy Areas of the European Union, Transportations. https://europa.eu/european-union/topics/transport\_el [in Grrek].  
• Transport Policy, A Journal of the World Conference on Transport Research Society (WCTRS), Elsevier. ISSN: 0967-070X. https://www.journals.elsevier.com/transport-policy  
• Transportation Research Part A: Policy and Practice. Elsevier. ISSN: 0965-8564. https://www.journals.elsevier.com/transportation-research-part-a-policy-and-practice  
• Pardali A. (2007). Ports economics and policies. Stamoulis Editions, ISBN: 978-960-351-689-7 [In Greek].   
• Profillidis, V. (2010). Air Transport and Airports. Papasotiriou Editions, ISBN: 978-960-7182-71-5 [In Greek].   
• Profillidis, V. (2016). Railway Science. Giahoudis Editions, ISBN: 978-960-12-1759-8 [In Greek].

### Smart Cities, Infrastructure and Transport

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΣΥΓ021 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Smart Cities, Infrastructure and Transport | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon completing the course students should be able to  •recognize the main elements of smart transportation, energy or infrastructure systems,  •implement principles of smart cities for the design of smart transportation, energy or infrastructure systems as well as principles of smart cities for data collection and assessment. | |
| **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*  *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…*  *…….* |
| The course contributes to the following skills: \_Search for, analysis and synthesis of data and information, with the use of the necessary technology  \_Adapting to new situations  \_Decision-making \_Project planning and management  \_Respect for the natural environment. | |

**SYLLABUS**

|  |
| --- |
| Sustainable cities  • Smart cities  • Examples of smart cities systems  • Algorithms and methods of smart systems for smart cities  • Smart infrastructures   • Vehicle-to-Vehicle communication  • Vehicle-to-Infrastructure communication. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, e-learning platform for educational material |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 52 | | Individual study | 78 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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 exam (100%) which includes: - Open ended questions  - Problem solving questions (exercises)  The evaluation criteria are presented in the 1st lecture of the semester to all students. Furthermore, each student can see his graded exam/ written assignment paper and talk on the analysis of his written performance with the professor. |

**ATTACHED BIBLIOGRAPHY**

• Leon-Garcia, A., Lenort, R., Holman, D., Staš, D., Krutilova, V., Wicher, P., Cagáňová, D., Špirková, D., Golej, J., Nguyen, K. (2016). Smart City 360°. Springer International Publishing, HEAL-Link Springer ebooks. ISBN: 9783319336817.  
• Proceedings of the 4th International Conference on Smart City Applications, 2019, ACM Other conferences, Association for Computing Machinery, HEAL-Link ACM Proceedings, ISBN: 9781450362894.  
• Skulimowski, A.M.J., Sheng, Z., Khemiri-Kallel, S., Cérin, C., Hsu, C-H (2018). Internet of Vehicles. Technologies and Services Towards Smart City, Lecture Notes in Computer Science. Springer International Publishing, HEAL-Link Springer ebooks, ISBN: 9783030050818.  
• Zeng, X., Xie X., Sun, J., Ma, L., Chen, Y. (2017). International Symposium for Intelligent Transportation and Smart City (ITASC) 2017 Proceedings, Smart Innovation Systems and Technologies. Springer Singapore, HEAL-Link Springer ebooks, ISBN: 9789811035753.  
• Mouratidis, A.K. (2008). Road Construction, The Management of Road Projects. University Studio Press, ISBN: 978-960-12-1759-8 [IN GREEK].

### Hydraulic Structures Dams

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ014 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Hydraulic Structures Dams | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to:  • Determine the useful volume and structural characteristics of dams.  • Differentiate the most suitable arrangement (dam, hydraulic structures) in space based on selection criteria.  • Calculate design flood hydrographs and sediment volumes.  • Design the required special hydraulic structures.  • Develop hydraulic models and perform calculations for safety works.  • Evaluate hydraulic data and define the type of dam that should be selected. | |
| **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*  *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…*  *…….* |
| 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**

|  |
| --- |
| Course Description:  The course aims to provide students with the necessary theoretical background for the course 'ΥΔΡ014 Hydraulic Structures Dams'. It includes the essential material for understanding theories and principles required for dam design at a pre-feasibility level, the selection of dam types, and hydraulic calculations of fundamental hydraulic structures in the relevant space. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Project(s) | 10 | | Educational visit |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek Written Examination with Extended Response Questions (Formative and/or Conclusive) Theory Assessment (80% of the final grade): • Written progress exam (20% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises • Final written exam (60% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises Individual Assignment (20% of the final grade) 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. The outline is communicated orally to the students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Τσόγκας Χρήστος Ερ.,Τσόγκα Ελισάβετ Χ., Υδροδυναμικά Eργα - Φράγματα, Εκδόσεις ΊΙων, 2009, ISBN: 960-411-196-5. Κωδικός Βιβλίου στον Εύδοξο: 14865  
• [In Greek] Μιμίκου Μαρία Α., Τεχνολογία Υδατικών Πόρων, Εκδόσεις Παπασωτηρίου, 2006, ISBN: 978- 960-7530-79-0. Κωδικός Βιβλίου στον Εύδοξο: 9780  
• [In Greek] Δερμίσης Β., Διευθετήσεις Υδατορρεύματος, Εκδόσεις ΤΖΙΟΛΑ, 2010, ISBN: 978-960-418- 296-1. Κωδικός Βιβλίου στον Εύδοξο: 18548763  
• [In Greek] Ι.Δ.Δημητρίου, Δ.Ι.Δημητρίου, ΠΕΡΙΒΑΛΛΟΝΤΙΚΗ ΥΔΡΑΥΛΙΚΗ, Εκδόσεις fountas, 2009, ISBN: 978960330675-7. Κωδικός Βιβλίου στον Εύδοξο: 4320  
• [In Greek] Τσακίρης Γ., Υδατικοί πόροι : I Τεχνική υδρολογία και διαχείρηση των υδατικών πόρων, Εκδόσεις ΣΥΜΜΕΤΡΙΑ, 2012 (1η έκδοση), ISBN: 978-960-266-380-6. Κωδικός Βιβλίου στον Εύδοξο: 22771790

### Irrigation and Drainage Systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ015 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Irrigation and Drainage Systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to:  • Identify and describe the required land improvement projects.  • Explain the complex natural problem of water-soil-crops-atmosphere interaction.  • Calculate and design an irrigation network and its necessary structures.  • Adapt appropriate regulation and protection devices to the entire irrigation project.  • Evaluate and assess technical, environmental, and economic factors in the design of land improvement projects.  • Synthesize and propose optimal design solutions for irrigation projects. | |
| **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*  *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…*  *…….* |
| 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**

|  |
| --- |
| Course Description:  The course aims to provide students with the fundamental theoretical background for the course 'ΥΔΡ015 Irrigation and Drainage Systems'. It includes the necessary material for understanding theories and principles of (a) agricultural hydraulics, (b) quantitative assessment of irrigation water, (c) design and operation of land improvement projects, and (d) economic design of irrigation projects and networks. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Project(s) | 10 | | Educational visit |  | | Individual study |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek Written Examination with Extended Response Questions (Formative and/or Conclusive) Theory Assessment (80% of the final grade): • Written progress exam (20% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises • Final written exam (60% of the final grade) which includes: o Extended Response Theoretical Questions (Formative and/or Inferential) o Solving problems-exercises Individual Assignment (20% of the final grade) 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. The outline is communicated orally to the students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Τσακίρης Γεώργιος, Υδραυλικά Έργα, Σχεδιασμός και Διαχείριση, ΤΟΜΟΣ ΙΙ: Εγγειοβελτιωτικά Έργα, Εκδόσεις Συμμετρία, 2006, ISBN: 978-960-266-171-0. Κωδικός Βιβλίου στον Εύδοξο: 45381  
• [In Greek] Γεωργική υδραυλική, Γεωργική υδραυλική, Εκδόσεις Ζήτη, 1997, ISBN: 960-431-404-1. Κωδικός Βιβλίου στον Εύδοξο: 11157  
• [In Greek] Παπαμιχαήλ Δημήτρης, Μπαμπατζιμόπουλος Χρήστος, Εφαρμοσμένη Γεωργική Υδραυλική, Εκδόσεις Ζήτη Πελαγία Σια Ι.Κ.Ε., 2014, ISBN: 978-960-456-415-6. Κωδικός Βιβλίου στον Εύδοξο: 41960118  
• [In Greek] Τζιμόπουλος Χρήστος, Γεωργική υδραυλική, Τόμος Ι, Εξατμισοδιαπνοή - διηθητικότητα - ατομικά δίκτυα, Ζήτη, 1982, ISBN: 978-960-456-171-1. Κωδικός Βιβλίου στον Εύδοξο: 11423  
• [In Greek] Τζιμόπουλος Χρήστος, Γεωργική υδραυλική, Τόμος ΙI, Συλλογικά αρδευτικά δίκτυα με καταιονισμό, Ζήτη, 1995, ISBN: 978-960-456-158-2. Κωδικός Βιβλίου στον Εύδοξο: 11424

### Computational Hydrodynamics and Structures

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ016 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Computational Hydrodynamics and Structures | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to:  • Identify and describe the basic principles of finite volume numerical methods.  • Distinguish the scope and applicability of turbulence models.  • Develop simple computational codes to solve basic hydrodynamic use cases.  • Understand and utilize open-source computational fluid dynamics software.  • Construct computational models for calculating hydrodynamic loads on structures.  • Evaluate computational techniques used by commercial or open-source hydrodynamic analysis codes. | |
| **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*  *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…*  *…….* |
| 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**

|  |
| --- |
| Course Description:  The course aims to provide students with the fundamental theoretical background for the course 'ΥΔΡ016 Computational Hydrodynamics and Structures'. It includes the necessary material for computational modeling of hydrodynamic interaction problems with structures and for students to gain a solid understanding of the physics of hydrodynamic interaction with structures, mathematical modeling of fluid flow, and computational simulation using appropriate software tools. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Project(s) | 10 | | Individual study | 68 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek  Written Examination with Extended Response Questions (Formative and/or Conclusive)  Theory Assessment (80% of the final grade):  • Written progress exam (20% of the final grade) which includes:  o Extended Response Theoretical Questions (Formative and/or Inferential)  o Solving problems-exercises  • Final written exam (60% of the final grade) which includes:  o Extended Response Theoretical Questions (Formative and/or Inferential)  o Solving problems-exercises  Individual Assignment (20% of the final grade)  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.  The outline is communicated orally to the students during the first lecture. |

**ATTACHED BIBLIOGRAPHY**

• [In Greek] Σούλης Ιωάννης, ΥΠΟΛΟΓΙΣΤΙΚΗ ΜΗΧΑΝΙΚΗ ΡΕΥΣΤΩΝ, Εκδόσεις ΧΑΡΑΛΑΜΠΟΣ ΝΙΚ. ΑΪΒΑΖΗΣ, 2008, ISBN: 978-960-99293-2-5. Κωδικός Βιβλίου στον Εύδοξο: 1100  
• [In Greek] Versteeg Η.Κ., Μalalasekera W., Εισαγωγή στην Υπολογιστική Ρευστοδυναμική, Εκδόσεις ΤΖΙΟΛΑ, 2015 (2η έκδοση), ISBN: 978-960-418-343-2. Κωδικός Βιβλίου στον Εύδοξο: 50655976  
• [In Greek] Chung T.J., ΥΠΟΛΟΓΙΣΤΙΚΗ ΡΕΥΣΤΟΔΥΝΑΜΙΚΗ, Εκδόσεις FOUNTAS, 2019 (2η έκδοση), ISBN: 9789603307884. Κωδικός Βιβλίου στον Εύδοξο: 86054605  
• [In Greek] Σούλης Ιωάννης, Υπολογιστικές τεχνικές Υδραυλικής Μηχανικής, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016, ISBN: 978-960-603-044-4. Κωδικός Βιβλίου στον Εύδοξο: 320306  
• 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

### Marine renewable energy systems

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΥΔΡ017 | **SEMESTER** | | 9th | |
| **COURSE TITLE** | Marine renewable energy systems | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
|  | | | 4 | | 5 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** |  | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes | | | | |
| **COURSE WEBSITE (URL)** |  | | | | |

**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* | |
| Upon successful completion of the course, students will be able to:  • Determine the marine wave and/or wind resources in coastal and offshore areas.  • Identify the structural elements of marine energy systems and assess their critical loading conditions (hydrodynamic, aerodynamic).  • Calculate and evaluate energy production from marine energy systems.  • Design the basic structural infrastructure of marine energy systems.  • Develop and assemble computational models for the analysis of offshore wind turbines and wave energy converters.  • Specify the requirements of computational codes for reliable coupled analysis of marine energy systems. | |
| **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*  *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…*  *…….* |
| 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**

|  |
| --- |
| Course Description:  The course aims to provide students with the fundamental theoretical background for the course 'ΥΔΡ017 Marine Renewable Energy Systems'. It includes the necessary material for understanding computational modeling, analysis, and design of energy systems in a marine environment (offshore wind turbines, wave energy converters), as well as computational simulation using appropriate software codes. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | 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. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 40 | | Practice/exercises | 12 | | Project(s) | 15 | | Individual study | 63 | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***130*** | |
| **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.* | Evaluation Language: Greek  Written Examination with Extended Response Questions (Formative and/or Conclusive)  Theory Assessment (70% of the final grade):  • Written progress exam (10% of the final grade) which includes:  o Extended Response Theoretical Questions (Formative and/or Inferential)  o Solving problems-exercises  • Final written exam (60% of the final grade) which includes:  o Extended Response Theoretical Questions (Formative and/or Inferential)  o Solving problems-exercises  Assignment Assessment (30% of the final grade):  • Written assignment  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.  The outline is communicated orally to the students during the first lecture. |

**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  
• Anaya-Lara, Offshore Wind Energy Technology, Εκδόσεις HEAL-Link Wiley UBCM ebooks - John Wiley Sons, 2018, ISBN: 9781119097808. Κωδικός Βιβλίου στον Εύδοξο: 91721601  
• Pecher A., Kofoed J.P., Handbook of Ocean Wave Energy, HEAL-Link Wiley UBCM ebooks - Springer International Publishing, 2017, ISBN: 9783319398891. Κωδικός Βιβλίου στον Εύδοξο: 75486625  
• Greaves D., Iglesias G., Wave and Tidal Energy, HEAL-Link Wiley UBCM ebooks - John Wiley Sons, 2018, ISBN: 9781119014492. Κωδικός Βιβλίου στον Εύδοξο: 91726099  
• 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  
• Chakrabarti Subrata K., Handbook of Offshore Engineering, Elsevier Ltd., ΙSBN 978-0-08- 044381-2, 2005.

### Diploma Thesis

**GENERAL**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCHOOL** | Engineering | | | | |
| **ACADEMIC UNIT** | Civil Engineering | | | | |
| **LEVEL OF STUDIES** | Undergraduate | | | | |
| **COURSE CODE** | ΔΙΠ001 | **SEMESTER** | | 10th | |
| **COURSE TITLE** | Diploma Thesis | | | | |
| **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* | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
| Diploma project | | |  | | 30 |
|  | | |  | |  |
|  | | |  | |  |
| *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* | Specialization Course | | | | |
| **PREREQUISITE COURSES:** | Prerequisite ECTS: Yes (180 ECTS) Prerequisite knowledge: Yes (prerequisite courses vary according to the specialization field). | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** |  | | | | |
| **COURSE WEBSITE (URL)** | http://civil.ihu.gr/pps.html | | | | |

**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* | |
| Upon successful completion of the Diploma Thesis, the student is expected to be able to: • Apply scientific knowledge acquired during his postgraduate studies in Civil Engineering, with an emphasis on a chosen specialization field/ direction. • Apply specialized scientific knowledge related to the Thesis’ subject, studied experimentally / by research. • Be familiar with the tools and methodology of scientific research and be able to use them in the future. • Produce scientific papers and present them in public, aiming at disseminating knowledge and communicating with the scientific community. | |
| **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*  *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…*  *…….* |
| The Diploma Thesis contributes to the following skills: \_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 interdisciplinary environment  \_Production of new research ideas \_Project planning and management \_Respect for the natural environment \_Criticism and self-criticism \_Production of free, creative and inductive thinking | |

**SYLLABUS**

|  |
| --- |
| The Diploma Thesis concerns the writing and public presentation of an extensive scientific paper that delves into specialized knowledge. The student studies bibliographically and experimentally or by research a specific topic that is part of one of the fields/ directions of Civil Engineering: Structural Engineering, Geotechnical Engineering, Transport Engineering or Hydraulics Engineering. |

**TEACHING and LEARNING METHODS - EVALUATION**

|  |  |
| --- | --- |
| **DELIVERY** *Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Communication via e-mail and Zoom platform. Use of the e-learning platform if needed. |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Tutorials | 60 | | Individual study | 470 | | Project(s) | 250 | |  |  | |  |  | |  |  | |  |  | |  |  | |  |  | | Course total (26 hours workload per ECTS credit) | ***780*** | |
| **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.* | The evaluation of the diploma thesis is composed of the following: A. Quality of content and structure of the submitted scientific assignment (70%) B. Level of knowledge on the specific scientific topic and capability of answering the examination committee’s questions during the public presentation of the thesis (20%) C. Consistency regarding the whole procedure (meeting deadlines, handing in interim deliverables etc.) and level of cooperation with the Supervisor during the development of the assignment (10%). The evaluation criteria of the diploma thesis are clearly mentioned in the DIPLOMA THESIS OUTLINE, posted on the Department's website, accessible to all students. |

**ATTACHED BIBLIOGRAPHY**

\_Bell, J. Waters, S., 2014. Doing Your Research Project. A Guide for First-time Researchers. McGraw-Hill Education Editions.   
\_Dimitropoulos, E., 2009 (3rd ed). Introduction to Scientific Research Methodology. Athens: G. Parikos Editions [in Greek].   
\_Eco, Umberto, 2015. How to Write a Thesis. Translated by C. Mongiat Farina and G.Farina. [E-book]. The MIT Press.