SOIL MECHANICS II

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40601	**SEMESTER**	6th
COURSE TITLE	SOIL MECHANICS 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 (ECTS)**
Lectures and Laboratory Exercises	6 hours/week *(LECTURES4hours&LABORATORY EXERCISES 2 hours)*	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 Area course**
PREREQUISITE COURSES:	There are no prerequisite courses, however, the students should already have attended the previous semesters' courses and must also attend the current semester courses, especially Mechanics and Soil Mechanins I.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (In English)
COURSE WEBSITE (URL)	YES in the Open eClass platform (Asychronous e Learning platform).

2. 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, the students should be able to comprehend and calculate:

- The settlement of saturated clay soils
- The shear strenght of several types of soils and standard laboratory tests through which they are determined
- The earth pressure on retaining structures.
- The slope stability of a natural or a man – made slope.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others… …….*

- Working independently.
- Team work.
- Project planning and management
- Respect for the natural environment
- Production of free, creative and inductive thinking.

3. SYLLABUS

- Settlements of clay. Theory of consolidation. Drainage, normally consolidated and overconsolidated clay. Calculation of total settlements. Time rate of consolidation.
- Shear strength of soil. Types of laboratory testing. Mohr- Coulomb failure criterion. Stresses , displacements and shear strength of granular an cohesive soils. Soil shear strength of saturated drained and undrained soils .
- Lateral earth pressure. Active and passive pressure. Methods of calculation (Rankine, Coulomb)
- Slope stability. Infinite slopes. Finite slopes. Taylor's method. Stability analysis by method of slices for steady-state seepage.

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face.
Lectures in the class in Power Point with the use of videoprojector.
The Laboratory education takes place at the Soil Mechanics Laboratory.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of the Information and Communication Technologies (ICT) in Teaching.Support of the learning process through the electronic e-class platform.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Attendance of Lectures (3 hours x 13 weeks)</td><td>26</td></tr>
<tr><td>Participation in optional practice exercises that are given in the classroom and focus on Civil Engineering applications</td><td>24</td></tr>
<tr><td>Preparation for the laboratory exercises and reports</td><td>50</td></tr>
<tr><td>Independent Study</td><td>50</td></tr>
<tr><td>Course total</td><td>150</td></tr>
<tr><td>(25 hours workload per credit)</td><td>(6 ECTS x25) = 150</td></tr>
</table>
</td></tr>
<tr><td>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.</td><td>For the theoretical part of the course the evaluation is done:
• With practice exercises. The participation in the final grade is 10%. • With the final written exam that participates by 80% in the final grade.
For the laboratory part of the course:
the student is obliged to attend and participate with the delivery of laboratory exercises in the performance of laboratory exercises. The participation in the final grade is 10%.</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. ΕΔΑΦΟΜΗΧΑΝΙΚΗ Αρχές και Εφαρμογές, G.E.Barnes, ΚΛΕΙΔΑΡΙΘΜΟΣ, 2005
2. Braja M. Das, Fundamentals of Geotechnical Engineering, Brooks/Cole
3. Στοιχεία Εδαφομηχανικής , Μ.Καββαδά, http://users.ntua.gr/kavvadas/Books/books.htm
4. ΕΔΑΦΟΜΗΧΑΝΙΚΗ ασκήσεις και προβλήματα, Γ. Γραμματικόπουλος, Ν. Μάνου – Ανδρεάδου, Θ. Χατζηγώγος, Εκδόσεις Αφοι Κυριακίδη
5. Παπαχαρίσης Ν., Μάνου-Ανδρεάδη Ν., Γραμματικόπουλος Ι., Γεωτεχνική Μηχανική, Εκδόσεις Αφοι Κυριακίδη, 1999.
6. Lambe,T.W. &Whitman,R.V. Soil Mechanics John Wiley & Sons, New York (1969)
7. Holtz,R.D. &Kovacs,W.D. An introduction to Geotechnical Engineering , Prentice-Hall, N.J. (1981)
8. Soil Mechanics and Foundation Engineering, V.N.S.Murthy, UBSPD,1993
9. Day, R.W. Geotechnical & Foundation Engineering , Mc Graw- Hill, N.Y. (1999)

DYNAMIC ANALYSIS OF STRUCTURES

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40602	**SEMESTER**	6th
COURSE TITLE	DYNAMIC 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 (ECTS)**
Lectures (and optional Laboratory Exercises)	4 hours/week *(LECTURES)*	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*	Specialized General Knowledgecourse / Scientific Area course
PREREQUISITE COURSES:	There are no prerequisite courses, however, the students should already have attended the previous semesters' courses and must also attend the current semester courses.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (In English)
COURSE WEBSITE (URL)	YES in the Open eClass platform (Asychronous eLearning platform) : https://eclass.uop.gr/modules/auth/opencourses.php?fc=82 https://eclass.uop.gr/courses/CIVIL106/ (For students with entrance before 2019 : https://eclass.pat.teiwest.gr/eclass/modules/auth/opencourses.php?fc=86 https://eclass.pat.teiwest.gr/eclass/courses/768114/)

2. 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, the students should be able to:

- Distinguish between static and dynamic loadings.
- Distinguish the essential characteristics of a structuraldynamic problem (dynamic loads, simulation of the structure, mass, damping, stiffness, dynamic response).
- Understand the approach of damping in structures with the form of viscous damping.
- Formulate the equation of motion of a single-degree-of-freedom system for dynamic loads and earthquake excitations.
- Analyze the free vibration of a single-degree-of-freedom system (without and with damping).
- Determine the dynamic response of a single-degree-of-freedom system subjected to harmonic or general dynamic loading, taking into account the effect of viscous damping.
- Use free software and open source software for the computer-aided dynamic analysis of single-degree-of-freedom systems.
- Know how to formulate the equations of motion of simple and also complexmodels (of single-degree-of-freedom, generalized single-degree-of-freedom and multi-degree-of-freedom systems) for dynamic loads and for earthquake excitations and know how to solve the equations of motion.
- Formulate the equations of motion of a multi-degree-of-freedom system (structure) for dynamic loads and earthquake excitations, calculating first the mass, damping and stiffness matrices of this structure.
- Calculate the natural frequencies (eigenfrequencies) and the natural mode shapes (natural modes, eigenvectors) of a multi-degree-of-freedom system (structure).
- Determine the dynamic response of multi-degree-of-freedom systems (structures) either by the modal superposition method or by the step-by-step time integration method of their equations of motion.
- Use free software and open source software for the computer-aided dynamic analysis of 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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*

Production of new research ideas	*Others…* …….

- Search for, analysis and synthesis of data and information, with the use of the necessary technology.
- Working independently.
- Team work.
- Working in an interdisciplinary environment.
- Production of new research ideas.
- Production of free, creative and inductive thinking.

3. SYLLABUS

- Dynamic loading of structures. Differences from static loading.
- Dynamic analysis of single-degree-of-freedom systems. The equation of motion of single-degree-of-freedom systems for dynamic loads and earthquake excitations. Stiffness and damping of single-degree-of-freedom systems. Free vibration of single-degree-of-freedom systems. Forced vibration ofsingle-degree-of-freedom systems. Generalized single-degree-of-freedom systems. Computer-aided dynamic analysis of single-degree-of-freedom systems.
- Dynamic analysis of multi-degree-of-freedom systems (structures). The equation of motion of multi-degree-of-freedom systems (structures) for dynamic loads and earthquake excitations. Free vibration of multi-degree-of-freedom systems. The eigenvalue mathematical problem. Natural frequencies (eigenfrequencies) and natural mode shapes (natural modes, eigenvectors). Methods for the calculation of eigenvalues and eigenvectors. Forced vibration response of multi-degree-of-freedom systems.Dynamic analysis of multi-degree-of-freedom systems (structures) using the modal superposition method or the step-by-step numerical time integration method. Computer-aided dynamic analysis of structures.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face. Lectures. Exemplary solving of exercises. Practice exercises and exercises using a computer. Use of Information and Communication Technologies in Teaching. Classroom and Computer Center B4. Office hours for additional student support. A Textbook is provided (with a choice among 3 books) through the "Evdoxos" Electronic Service. Additional educational electronic material is provided during teaching and / or through the Open eClass eLearning Platform. Additional printed educational material is provided in the classroom. Exercises and computer-aided exercises are also distributed, and their solutions are commented in detail in class. The exercises are enriched (if required) on an annual

	basis. The additional educational material (printed and electronic) is updated and enriched (if required) on an annual basis. The students are trained in the research process through weekly exercises and additional optional projects.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of the Information and Communication Technologies (ICT) in Teaching. Use of open source software. Software for dynamic analysis of structures. Support of the learning process through the electronic e-class platform. Additional educational electronic material is provided during the teaching and through the Open eClass eLearning Platform (Electronic presentations/powerpoint, electronic multiple-choice exercises, exercises, etc.) Software related to the subject of the course: Free and open source software (from the official websites). Software trial versions (trial versions, evaluation versions) (from the official websites). Also, one of the three textbooks(provided through the "Evdoxos" Electronic Service) includes the FORTRAN source code of related computer programs. The computer-aided exercises can be performed by the students at the Computer Center B4.

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***
Attendance of Lectures (4 hours x 13 weeks)	52
Participation in optional practice exercises or/and optional projects that are given in the classroom and focus on Civil Engineering applications	7
Participation inoptional computer-aidedexercises on computationalapplications of the Dynamic Analysis of Structures.	7
IndependentStudy	56
Final examination (3 hours)	3
Coursetotal	***125***
(25 hours workload per credit)	***(5ECTS x25) = 125***

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 at the end of the semester. Active systematic attendance of the Lectures of the course by the students and their successful participation in optional practice exercises can contribute "positively" the additional grade "**A**" at a rate of 5% in the final grade.

Successful participation of the students in additional optional exercises, optional projectsand optional computer-based exercises :can contribute "positively" the additional grade "**P**" at a rate of 10% in the final grade.

The final grade of the course is calculated as follows:

Final Course Degree = min **[(FE** + 0.05**A**+ 0.1**P)**, 10**]**

where "**FE**" is the grade of the Written **F**inal **E**xamination which is not allowed to be less than 4 in order the grades "A" and "P" to be activated.

The above applies to the academic year in which the students declare the course for the first time. In case of failure or non-attendance at the Written Final Examination (in June and September), in each subsequent academic year the students are graded only on the basis of the written final examination of the course.

5. ATTACHED BIBLIOGRAPHY

- **Chopra**, Anil K., "Dynamics of Structures, Theory and Applications to Earthquake Engineering", 3rd edition, M. Giourdas&Co G.P. Publications, 2008. (Book Code in "Eudoxos" 12280). [Translation in Greek]. The original English 3rd edition by Pearson, 2007 & the new 5thedition by Pearson, 2017.
- **Katsikadelis**, Ioannis Th.,"Dynamic Analysis of Structures", S. Athanasopoulos& Co G.P. Publications, 2012. (Book Code in "Eudoxos" 22768979). [In Greek].
- **Clough**, R.W. &**Penzien**, J., "Dynamics of Structures", GrigoriosChrysostomou Fountas Publications, 2006. (Book Code in "Eudoxos" 4314). [Translation in Greek]. The original English2nd edition by McGraw-Hill, 1993, the 3rd edition by Computers & Structures, Inc., 2003.
- D.-P. N. Kontoni, "Dynamic Analysis of Structures - Solved Problems", Patras, 1985-2019.
- Extensive Bibliography in English on topics of “Dynamic Analysis of Structures” in problems of the Civil Engineering specialty.
- Scientific Publications in English authored by Dr. D.-P. N. Kontoni on topics of “Dynamic Analysis of Structures”.

REINFORCED CONCRETE II

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40604	**SEMESTER**	6th
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**
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*	Specialised general knowledge
PREREQUISITE COURSES:	There are no prerequisite courses. Students musthave knowledge of the course“Reinforced Concrete I”.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	

2. 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 delve deeper intothe design and detailing of Reinforced Concrete Structures.

After the end of the course the Student will be able to:

- Calculate the anchorage length of steelreinforcement.
- Design three-edge-supported and two-edge-supported slabs.
- Design elements subjected to punching shear.
- Design shear walls.
- Design shallow foundations and foundation elements.
- Design concrete elements subjected to torsion.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Working independently

Project planning and management

3. SYLLABUS

- Bond of concrete to steel. Anchorage of steel reinforcement.
- Design and detailing of three-edge-supported and two-edge-supported slabs.
- Unfavorable actions on continuous slabs.
- Design and detailing of slabs for concentrated loads according to the Ultimate limit state for punching shear.
- Design and detailing of shear walls.
- Foundation elements: Design of shallow foundations (footings, strip foundation, raft foundation) and detailing.
- Ultimate limit state design of concrete elements subjected to torsion.

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face lectures</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of ICT in some lectures.
Support of learning process through e-class electronic platform.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>52</td></tr>
<tr><td>Some individual essay writing</td><td>16</td></tr>
<tr><td>Independent study</td><td>73</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course Total
(25 hours of workload per ECTS credit)</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>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.</td><td>Written final exam (100%) of problem-solving exercises with combined content.</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Reinforced Concrete Design, Bill Mosley, John Bungey, Ray Hulse.
- Reinforced Concrete, Th. Georgopoulos, Self-publication. (in Greek)
- Design of Solid Constructions, Karavezyroglou-Weber, Tziola Publications. (in Greek)
- Design of Reinforced Concrete Structures I, A. Tsonos, Sofia Publications. (in Greek)
- Reinforced Concrete Constructions according to the new Regulations of Reinforced Concrete and Anti-Seismic Constructions, G. Penelis, K. Stylianidis, A. Kappos, C. Ignatiadis, Aivazi Publications. (in Greek)
- Reinforced Concrete, M.N.Fardis, Volumes I, II, II. (in Greek)

CONSTRUCTION PROJECT MANAGEMENT

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40605	**SEMESTER**	6th
COURSE TITLE	SURVEYING		

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*	specialised general knowledge
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes, in English
COURSE WEBSITE (URL)	

2. 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*

After the successful completion of the course

● The students will understand the meaning of construction site organization and management.

● They will acquire skills in order to study the structural analysis of a project and identify sequential relationships between the phases of the project.

● They will be able to make the timeline of project by solving arched and nodal networks.

● They will use work management methodologies to identify key elements, such as the critical path, dependencies on a realistic project.

● They will calculate the duration of phases of the technical project, as well as the required number of resources for each phase.

● They will also watch the recourse allocation during the construction of the project and when is necessary they will have the skills to smooth out the unequal distributions.

● They will be able to study the legislation and control the application of security and hygiene rules during the execution of technical works to avoid accidents.

● They will have the knowledge to choose the appropriate technical work machines, that are needed for the construction of a project.

● They will have acquired the necessary knowledge to calculate the duration for the construction of a project.

•

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
- Project planning and management
- Working independently
- Team work
- Respect for the natural environment

3. SYLLABUS

A. CONSTRUCTION SITE ORGANIZATION AND MANAGEMENT

Concept and structure of the construction site. Construction site workforce. Design of construction site. Timeline of Project. Analysis of project structure – Sequence of work. Arched networks. Key networks. Gantt chart. Critical path method (CPM). PERT method. Resource planning (resource allocation diagram and its leveling diagram). Economic planning of project (Direct and Indirect Costs, graphic illustration of direct cost and cumulative cost).

B. TECHNICAL WORK MACHINES

Introduction to technical work machines. Division of machines into categories and their use. Calculation of hourly production of excavator, loader, promoter and dumpers. Calculation of machine rental costs. Calculation of the duration of work cycle. Calculation of project duration.

C. PROJECT SECURITY

Health and safety of engineering project workforce. Current legislation. Sources of risk. Instructions for different work types. Security measure Coordinator. Health and safety plan. Health and safety File. Safety Technician. Project Physician. Individual protection measures. Work accident. Labor inspectorate. Work notice in advance. Security measure calendar.

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of ICT in teaching</td></tr>
<tr><td>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</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lecture 4 hoursx13</td><td>52</td></tr><tr><td>Independed study</td><td>47</td></tr><tr><td>Exercises 2 hoursx13</td><td>26</td></tr><tr><td></td><td></td></tr><tr><td>Course total</td><td>125</td></tr></table></td></tr>
<tr><td>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.</td><td>Final written exam.

The successful participation of students in optional exercises can contribute positively 10%.</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography (in Greek):

1. Kastrikakis Antonios (2002) “Technical Construction Management”

2. Moutsopoulou Amalia (2007) “Systematic management of Hygiene and occupation safety in technical projects”

3. Harvey Maylor (2005) “Project management”

4. P. Marhavilas “Hygiene and occupation safety, occupation hazard management:

HYDROLOGY – FLOOD-PROTECTION WORKS

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40606	**SEMESTER**	6th
COURSE TITLE	HYDROLOGY – FLOOD-PROTECTION 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**
Lectures (4 hours/week)	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 area course
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (In English)
COURSE WEBSITE (URL)	YES in the Open eClass platform (AsynchronouseLearning platform).

2. 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*

By the end of the course students are intended to become familiar with:

• the concept of the catchment area and the principles of the hydrologic cycle.

• the concepts of the Hydrologic balance and the hydrologicparameters (e.g.precipitation, runoff, etc.).

• the concept of flood events and hydrograph estimation methods for rainfall generated.

• thefrequencyanalysis of hydrologic events.

• the principles of design of flood protection works.

• theflood propagation methods.

• the principles of design of spillway related constructions.

• theprinciplesof redesign of river and torrentslandform (course and bank).

At the end of the course the student will have developed the following knowledge and skills:

• equation for hydrologic balance and problem solution.

• watershed definition.

• hydrograph estimation for rainfall generated.

• frequency analysis of hydrologic events.

• flood propagation study.

• design of spillway related constructions.

• redesign of river and torrents landform (course and bank), increase (enhancing) of river discharge and, design of dikes for flood protection.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

• Working independently

• Search for, analysis and synthesis of data and information, with the use of the necessary technology

•Respect for the natural environment

3. SYLLABUS

Hydrology: Definitions, Hydrological cycle, Hydrological balance.

Atmospheric precipitation, measurement methods, rain gauges,analysis of precipitation data.

Catchments and watersheds.

Thiessen method, average rainfall, intensity-duration-return period curves.

Evaporation and evapotranspiration, methods of measurement, methods of calculation.

Stream flow, flow measurement.

The concept of hydrograph and characteristic times, separation of base flow from flood flow.

Characteristics of hydrographs for flood events.

Unit hydrograph, calculation of unit hydrograph.

Estimation of precipitation losses.

Frequency analysis of hydrologic events: concepts of probability, types of probability distributions (distribution functions, frequency factor).

Flood protection works: Definitions, flood propagation, hydraulic and hydrologic methods.

Hydrologicpropagation througha river section: Muskingum method (applications).

Hydrological propagation through a reservoir (applications).

Design of spillway related constructions: Types of spillways and accompanying projects, elements of design of free spillways, energy dissipationconstructions (stilling basins).

Constructions forredesign of river and torrents landform (course and bank): Transverse and parallel works (cascade constructions, groynes), riverbank protection works.

Stream flow enhancement (increase of cross section, increase of flow rate).

Construction of flood dikes, design of river bank for flood events.

4. TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face (Lectures).</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Use of the Information and Communication Technologies (ICT) in Teaching. Support of the learning process through the electronic e-class platform.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Attendance of Lectures (4 hours x 13 weeks)</td><td>52</td></tr>
<tr><td>Independent Study</td><td>73</td></tr>
<tr><td></td><td></td></tr>
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<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>125</td></tr>
<tr><td>25 hours workload per credit</td><td>(5 ECTS x25) = 125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE</td><td>Final written examination (100%), during which solution of problems and answer of questions is</td></tr>
</table>

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.*	required.

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Βιβλίο [956]: ΤΕΧΝΙΚΗ ΥΔΡΟΛΟΓΙΑ ΤΟΜΟΣ 1 ΥΔΡΟΛΟΓΙΑ ΕΠΙΦΑΝΕΙΑΚΩΝ ΥΔΑΤΩΝ, ΣΑΚΚΑΣ ΙΩΑΝΝΗΣ

Βιβλίο [77117411]: Τεχνική Υδρολογία, 6η έκδοση, Μπαλτάς Ευάγγελος, Μιμίκου Μαρία