HYDRAULICS I

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40501	**SEMESTER**	5th
COURSE TITLE	HYDRAULICS 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**
Lectures	4 hours/week	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*	Background 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 basic concepts of fluid mechanics.

• the theory of the statics of the incompressible fluids.

• the equations of the dynamics of incompressible fluids: equations of continuity, momentum, energy.

• Euler and Bernoulli equations.

• the concepts of laminar and turbulent flow.

• the study of flow in closed conduits.

• the calculation of energy losses in pipelines.

• dimensional analysis and hydraulic similarity.

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

• calculation of pressure distribution in static fluids and hydrostatic forces on surfaces which are in contact with static fluids.

• study of the flow using the concept of control volume.

• application of dimensional analysis and hydraulic similarity.

• drawing of energy line and piezometricline.

• Analysis of pipelines in series, parallel pipelines, branch pipelines to tanks.

• design of closed pipeline systems.

• calculation of hydraulic machines (pumps-hydro turbines).

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

3. SYLLABUS

Properties of fluids, natural properties of water, fluid statics, manometers.

Fluid kinematics, stream lines, streak lines, path lines.

Archimedes' principle, water hydrodynamics.

Calculation of pressures and forces on tank walls.

Ideal fluids, real fluids.

The conceptof "system" and "control volume".

Basic flow equations: continuity equation, energy equation, momentum equation.

Ideal fluid flow: Euler and Bernoulli equations.

Vorticity and velocity potential, stream function, irrotational flow.

Real fluid flow: Laminar and turbulent flow.

Flow over solid boundary, boundary layer.

Flow in closed conduits: Basic hydraulic equations.

Calculation of energy losses in pipelines: linear losses, local losses, active length.

Energy line and piezometric line.

Pipelines in series, pipelines in parallel, branching pipes to tanks.

Design of closed pipeline systems, hydraulic machines (pumps-hydro turbines).

Dimensional analysis, Buckingham's theorem, hydraulic similarity.

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 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>
<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</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 EVALUATION

Description of the evaluation procedure

Language of evaluation, methods of</td><td>Final written examination (100%), during which solution of problems and answer of questions isrequired.</td></tr>
</table>

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.*	

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Βιβλίο [77107657]: Μηχανική Ρευστών, 2η Έκδοση, Λιακόπουλος Αντ.

Βιβλίο [41963463]: Μηχανική ρευστών, Πρίνος Παναγιώτης

Βιβλίο [77119353]: ΣΤΟΙΧΕΙΑ ΥΔΡΑΥΛΙΚΗΣ ΚΛΕΙΣΤΩΝ ΚΑΙ ΑΝΟΙΚΤΩΝ ΑΓΩΓΩΝ, ΑΛΕΞΑΝΔΡΟΣ ΔΗΜΗΤΡΑΚΟΠΟΥΛΟΣ

Βιβλίο [9654]: Εφαρμοσμένη Υδραυλική, Στάμου Αναστάσιος Ι.

Βιβλίο [22767973]: Υδραυλική Κλειστών και Ανοικτών Αγωγών, Πρίνος Παναγιώτης

Βιβλίο [1003]: Σούλης Ιωάννης (2008), Υδραυλική κλειστών αγωγών, Εκδόσεις Χαράλαμπος Νικ Αϊβάζης

Βιβλίο [77119457]: ΜΗΧΑΝΙΚΗ ΡΕΥΣΤΩΝ ΜΕ ΕΦΑΡΜΟΓΕΣ, ΤΖΙΡΤΖΙΛΑΚΗΣ ΕΥΣΤΡΑΤΙΟΣ - ΞΕΝΟΣ ΜΙΧΑΛΗΣ

SOIL MECHANICS I

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40502	**SEMESTER**	5th
COURSE TITLE	SOIL MECHANICS 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 (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.
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:

- The physical properties of soils
- The standard laboratory tests through which they are determination
- The systems of soil classification.
- The development of stresses in the soil due to the soil weight and external loads with the presence of water.
- Permeability and seepage of soils.

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

- Physical properties of soils. Mineralogy, soil phases, grain size analysis, plasticity.
- Classification of soils by standard methods
- Soil compaction. Principles, laboratory and in situ standard tests.
- General principles of mechanics of soil
- Stress distribution in the soil mass. Theory of Elasticity. Geostatic stresses and stresses due to external loads.
- Water in the soil under static conditions. Principle of effective stress.
- Steady water flow. Darcy's law. Soil permeability
- Two dimensional seepage. Flow nets, water pressure, rate of flow.

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>IndependentStudy</td><td>50</td></tr>
<tr><td>Coursetotal</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)

ROAD COSTRUCTION I - COMPUTER – AIDED ROAD CONSTRUCTION

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40503	**SEMESTER**	5th
COURSE TITLE	ROAD COSTRUCTION I - COMPUTER – AIDED ROAD 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**
	Lecture hours 3	5
	Lab hours 2	
	Total hours 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)	

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 be able to study and implement the construction of o road.

■ Specifically, the students will know how to study the geometric design of the road and the earthworks.

■ They will acquire the appropriate skills to prepare the required designs for the project and make the necessary calculations.

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 composing data and information, using the necessary technologies.

■ Decision making.

■ Working independently

■ Teamwork

■ Respect for the natural environment

3. SYLLABUS

1. ROAD ELEMENTS
2. TRAFFIC ON THE ROAD

Vehicles. Resistances to vehicle movement. Linear and curved sections of the road. Vehicle course at linear sections of road. Vehicle course at curved sections of road.

3. ROAD TRAFFIC EXAMINATION
4. EXAMINATION OF THE GEOMETRIC CHARACTERISTICS OF THE ROAD

a. Study of road at the horizontal level.

Isoclinic line (semislop). Polygonal line. Selection of appropriate radius. Length of spiral line. Deviation of the tangent of the cycle. Widthwise inclination of the road in its curved sections. Straight section between curved countermeasures. Widening of the roadway in the curves.

b. Study of road in the vertical level.

Ground and road length diagrams. Maximum longitudinal inclination. Fittings of the street lines with vertical curves.

5. EARTHWORK ROAD PROJECT

Road sections. Cross-sectional area measurement. Calculation of landfill volume. Diagrams of Medium Surfaces and Applicable Lengths. Landfill chart. Distribution and movement of land. Bruckner and Lalanne chart.

6. INTRODUCTION TO DIGITAL DESIGN SOFTWARE AND ROAD DESIGN

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 3 hours x 13</td><td>39</td></tr>
<tr><td>Laboratory practice 2hours x 13</td><td>26</td></tr>
<tr><td>Project</td><td>13</td></tr>
<tr><td>Independed study</td><td>47</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</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>THEORY:

Final written exam.
Percentage of participation in the total grade 60%.

LABORATORY:

Final written exam.
Percentage of participation in the total grade 40%.

■ Prerequisite for participation in the laboratory test is the completion of the project prepared by the student during the semester.</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Kofitsas D. Ioannis (2009) " Road design and intersection data"

2. Apostoleris K. Anastasios (2013) "Road construction"

- Related academic journals:

DESIGN OF WATER CLEANING AND WASTEWATER TREATMENT PLANTS

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40504	**SEMESTER**	5th
COURSE TITLE	DESIGN OF WATER CLEANING AND WASTEWATER TREATMENT PLANTS		

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	4 hours/week	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:	No prerequisite courses are need but the students should already have attended, in previous semesters, courses in Physics and Mathematics
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 (Asynchronous 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:

- Design facilities for water cleaning for dreaking water
- Design facilitiew for wastewater treatement

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 as a team in projects related to construction engineering
- Creation of new ideas in problems of civil engineering

- Ability to lead the scientific group for the study and construction of small and/or small projects
- Working by himself in engineering projects

3. SYLLABUS

- Introduction
- Design of facilities for water cleaning
- Wastewater engineering
- Wastewater flowrates
- Wastewater characteristics
- Wastewater treatment objectives, methods and implementation considerations
- Introduction to Wastewater treatment plant design
- Physical unit Operations
- Chemical Unit Process
- Biological Unit Process
- Design of facilities for physical and chemical treatment of Wastewater
- Design of facilities for the Biological treatment of Wastewater
- Advanced Wastewater treatment
- Design of facilities for the treatment and disposal of sludge
- Natural treatment systems
- Small wastewater treatment facilities
- Management of wastewater from combined sewers
-

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures in the class using the black board and/or computer techniques e.g Power Point with the use of video projector.
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.Support of the learning process through the electronic e-class 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***
	Attendance of Lectures (4 hours x 13 weeks)	52
	Participation in optional practice exercises that are given in the classroom and focus on Civil Engineering applications	52
	Independent Study	74
	Course total	*175*
	(25 hours workload per credit)	***(5 ECTS x35) = 180***
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 is done: • 70% of the final grade from the final examination, 15% from homework and 15% from midterms.	

5. BIBLIOGRAPHY

10. Τσιώλης Στ., Καθαρισμός νερού, εκδ Παπασωτηρίου 2010
11. Τσιώλης Στ., Επεξεργασία Λυμάτων, εκδ Παπασωτηρίου 2010
12. Χρυσικόπουλος Κ., Εισαγωγή στις διεργασίες καθαρισμού νερού και λυμάτων, εκδ Τζιόλα 2017
13. Tchobanoglus G., and Burton F., Wastewater engineering, treatment disposal reuse, McGraw-Hill Inc, 1972

RESTORATION OF HISTORICAL CONSTRUCTIONS – ARCHITECTURAL SURVEY

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	BACHELOR		
COURSE CODE	40505	**SEMESTER**	5th
COURSE TITLE	RESTORATION OF HISTORICAL CONSTRUCTIONS – ARCHITECTURAL SURVEY		

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+3	2+2
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 (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*

Students should acquire the necessary knowledge in order to evaluate a historical building and to distinguish its historical phases, a necessary step before the elaboration of its restoration study. Also, they should be able to decide on emergency rescue operations, if necessary before drawing up the final study.

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

- Carry out the theoretical and methodological approach of historic buildings, as well as the systematic treatment of their problems.
- Work on the preservation, restorationand enhancement of architectural monuments.
- Specialize in dealing with and solving problems of protection and preservation of architectural heritage.

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…

…….

Autonomous work

Group work

3. SYLLABUS

Introduction to the theme of restoration and interpretation of basic concepts (monument - properties, restoration, reconstruction, restoration, conservation - conservation, sanitation, revival). International organizations and international conventions. General principles and feasibility of protection and rehabilitation. Historical buildings evaluation. Investigation and evaluation of historical phases. Selection of preserved and non-maintained historic phases. Description of the factors that contribute to the deterioration of the monuments: bad repairs and wrong restorations, physical deterioration, man-made damage, internal and external causes of destruction, natural and accidental causes.

Examination of various maintenance and rehabilitation techniques. Methods of rescue interventions and parameters determining the final choice of the method. Methods of static solution of buildings with traditional ways of structure. The special case of the restoration of ancient monuments.

The restoration study technique will include:

1. Analytical procedure

A. Historical analysis - documentation, aiming at monitoring the evolution of the building over time (study of historical sources, collection of testimonies, identification, historical phases, presentation of documentation with earlier designs, archival and pictorial material); b. Architectural analysis - Photographic mapping, design imaging, typological and morphological analysis, structural structure - pathology), c. Structural analysis (analysis-data collection, near-field surveys, seismic risk, research into the characteristics of structural elements and materials, static design study, fixation interventions).

2. Synthetic procedure

Compilation of rehabilitation and reuse study: General principles-philosophy of interventions, compatibility study of the new use, restoration, maintenance, promotion and adaptation of the building in its new use, study of repair and fixation - static structural interventions and aids for restoration of the static adequacy of the building and restoration of the damaged, corroded or altered elements of the building. Architectural interventions, redevelopment of premises, modernization of facilities, proposals for architectural - morphological restorations, color organization of the building. Building Legislation. Rules of Building. Specifications, budget and timetables for the execution of the work.

Knowledge will be provided to students by theory and laboratory exercises, which will be the application of theory to a specific part of the cognitive subject at an individual or group level. The methodology also includes examples of completed studies.

Within the laboratory part, a building will be selected by the students (individually or in groups), with the cooperation and consensus of the teacher. It will be followed by

recognition of the original form by means of a first impression, which will allow the students to begin to learn the structure in depth and to approach the architecture of the building. They will deal with the depiction of floor plans, views, sections, axonometric and detail drawings. The analysis and study of the premises, the building system and the construction details will follow. An assessment of static and functional competence will be made.

Addressing the problem will be completed by studying maintenance, rehabilitation, reuse and projection projects, technically, economically and socially, and choosing the right solution for repair or reconstruction.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classroom
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Yes
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	50
Practice exercises that focus on the application of methodologies and analysis of studies in smaller groups of students	25
Group work on a study	50
Course total	***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,*	i. Written final examination ii. Presentation of group work

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.*	

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Νομικός Μ., Αποκατάσταση επανάχρηση ιστορικών κτιρίων και συνόλων. Μεθοδολογία – εφαρμογές, Θεσσαλονίκη, Α.Π.Θ. Τμήμα Αρχιτεκτόνων / Εκδόσεις Γιαχούδης, 1997.

Τ.Ε.Ε. Μαγνησίας, Συντήρηση και Αναβίωση Παραδοσιακών Κτιρίων και Συνόλων, Εκδόσεις UNIVERSITY STUDIO PRESS, ISBN 960-12-120.

Γαβρά Ε., Πολιτιστικό Απόθεμα και Αρχιτεκτονική Κληρονομιά στα Βαλκάνια, 2004, Εκδόσεις Κυριακίδη, ISBN 960-343-740-9.

Κωτσιόπουλος, Συντήρηση και Αναβίωση Ιστορικών Κτιρίων, Εκδόσεις Τ.Ε.Ε.

Παπαγεωργίου Αλεξ., Αθήνα-Ένα Όραμα του Κλασσικισμού, [ΦΕΚ 1203/Τεύχ. Β΄/2004], Εκδόσεις Καππόν, ISBN 960-703-702-2.

- Related academic journals:

TRAFFIC ENGINEERING AND DESIGN OF TRANSPORTATION SYSTEMS

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40506	**SEMESTER**	5th
COURSE TITLE	TRAFFIC ENGINEERING AND DESIGN OF TRANSPORTATION 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**
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 area course
PREREQUISITE COURSES:	There are no prerequisite courses
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
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 goal of the course is to introduce the students to the basic concepts of traffic engineering. The course aims at providing knowledge on the fundamental aspects of traffic flow as well as on measurement techniques for determining the traffic phenomenon. The course also has the scope to teach techniques for computing levels of road service, for traffic light system design and for parking design. Finally, the course also scopes to introduce the students to other types of transportation networks than road ones as well as to complete transportation systems.

After the successful completion of the course, the students will be able to:

- Know the basic object of traffic engineering
- Know the fundamental concepts and aspects of traffic flow like capacity, density and speed
- Know measurement techniques
- Determine the service level in a road
- Design a traffic light system
- Design a parking space
- Know the basic principles of railway and airtransport networks

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…*
	……

- Decision making
- Working independently
- Team work

3. SYLLABUS

Introduction to the concept of traffic engineering.
Basic characteristics of traffic flow: fundamental aspects of traffic flow (capacity, density, speed).
Rate of flow and coefficient of peak hours.
Composition of traffic and units of passenger vehicles.
Temporal and spatial separation. Diagrams of time-distance.
Applications of traffic measurements. Measurement at a point, road part or road network.
Fundamental relation of traffic flow. Computation of diagrams.
Traffic capability and level of service. Computations.
Traffic light operation. Determination of green light duration, phase resonance, saturation flow etc.
Parking places. Basic design rules and computations.
Introduction to other transportation networks like railways, airports, seaports.
Transportation systems, holistic approach to networks.
Transportation and applications of Geographic information Systems (GIS).

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to –face in the classroom
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Support of learning process through the electronic platform e-class
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*	
STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure*	Individual project 30% Final exam 70%

Activity	***Semester workload***
Lectures	52
Individual works	48
Individual study	25
Course total	**125**

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.*	

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

I.M.Frantzeskakis, I.K.Golias, M.C.Pitsiava-Latinopoulou, Traffic Engineering, Papasotiriou Press, Athens, 2009 (in Greek)-code in Evdoxos: 9699

E.G.Matsoukis, Traffic Engineering, Symmetria Press, Athens 2008 (in Greek)

E.G.Matsoukis, Transportation Design and Elements of Railway Engineering, Symmetria Press, Athens 2008 (in Greek)

K.Limberis, Railway Engineering: Theory and Applications: M. & S. Athanasopoulos, Athens, 2011 (in Greek)-code in Evdoxos: 12867047

K.Ambakoumkin, Airports, Symmetria Press, Athens, 1990 (in Greek)-code in Evdoxos: 45235

V.Profyllidis, Airplane Transportation and Airports, Papasotiriou Press, Athens 2010 (in Greek)

V.Profyllidis, Railway Engineering, Giahoudis Press, Thessaloniki 2016 (in Greek)

- Related academic journals:

Journal of Transportation Engineering of ASCE

Transportation Research