# 9.1 CE0910 – Road Construction Works

## (1) **GENERAL**

SCHOOL	ENGINEERING SCHOOL					
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT					
LEVEL OF STUDIES	UNDERGRADUATE					
COURSE CODE	CE0910 SEMESTER 9					
COURSE TITLE	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	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	Specialisation	Course (SC)				
PREREQUISITE COURSES:						
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek					
IS THE COURSE OFFERED TO ERASMUS STUDENTS						
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/PEY143/					

## (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 course aims at the student's understanding of the construction works required in Road Construction as well as the types of reinforced concrete or steel bridges in order to be able to design, study, supervise and construct such projects.

Emphasis is put on the development of methods to solve composite road construction problems, stormwater management in combination with retaining works, improvement of slopes, open or slab culverts in order to implement their theoretical knowledge to real problems.

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

- Recognize the basic issues of Road Construction Works as basic knowledge for the design and implementation of these structures
- Acquire the specific knowledge so as to understand and combine the methods of solving and apply them to

the behaviour of technical projects.

- Acquire the specific knowledge background required for the design, analysis and combination of knowledge of Road construction Hydrology and Foundations in order to be used in the construction of engineering structures.
- Apply data from the above knowledge fields to resolve certain key problems of the science of the Civil Engineering
- Familiarise themselves with the execution of this type of construction
- Understand the application of research and study methods in a road construction technical 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,	Project planning and management
with the use of the necessary technology	Respect for difference and multiculturalism
Adapting to new situations	Respect for the natural environment
Decision-making	Showing social, professional and ethical responsibility and
Working independently	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

The course aims at the following general skills:

- Search, analysis and synthesis of data and information, using the necessary technologies
- Decision making
- Project design and management
- Development of critical thinking
- Promote inductive thinking

## (3) SYLLABUS

- Introduction Elements of Final Road Design.
- Construction of embankments, shoulders.
- Sewerage and Subsurface Drainage: manholes, inspection manholes, ditches (triangular and trapezoidal cross-section), longitudinal profiles of ditches.
- Earth pressures (Rankine and Coulomb methods), stability of slopes- improvement: unreinforced and reinforced concrete retaining walls (Mononobe-Okabe method for seismic design of retaining walls). Anchored retaining walls. Reinforced earths retaing structures.
- Culverts: Pipe Culverts. Box and Slab Culverts.
- Bridges: Historical evolution. Classification of bridges based on traffic volumes, materials, structural scheme and the type of vehicles they carry. Bridge loads (DIN 1073, EC1). Calculation of intensive results using Rusch calculation tables for slabs. Bridge piers and abutments. Reinforced concrete voided slab bridges. Bridge Scaffolding.

### Assignments (Semester project)

• Project work:

Concerns the design of a hilly area road or the optimization of another existing road. The aim is for the student to apply creatively the knowledge from the subject of Road Construction in combination with his knowledge from previous courses in lower semesters, as well as the theoretical part of the present course to realize the road structures up to a stage of final design.

The knowledge of the course is applied in the design and construction of embankments, the required supports of vulnerable slopes by choosing an appropriate type of retaining wall, the overall drainage of storm water through ditches and the design of at least two underground works, pipe and slab culvert.

Upon completion of the project, the student will be able to have adequate comprehension skills of road construction and the various engineering structures required and therefore will be able to take part in relevant studies and supervision of infrastructure projects.

### • Educational Visits:

There is at least one educational visit to major road construction sites with a view to inform students about the type, problems and progress of project.

# (4) 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 using ICT, Communication and Electronic Submission.				
TEACHING METHODS					
The manner and methods of teaching are described in detail		Activity	Semester workload		
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		Lectures (Theoretical part)	26		
		Lectures (Practical Applications)	26		
		Personal Study for the Theoretical part	38		
		Personal Study for the Practical Applications	30		
		Semester project preparation	30		
		Course total	150		
<b>STUDENT PERFORMANCE EVALUATION</b> Description of the evaluation procedure Language of evaluation, methods of evaluation,	Language of evaluation: Greek				
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	(The written examination consists of two discrete parts, the first referring to the theoretical section of the course and the second referring to practical applications).				
Specifically-defined evaluation criteria are given, and if and where they are accessible to students.	Semester project: 40%				

## (5) ATTACHED BIBLIOGRAPHY

## Greek Bibliography:

- 1. Kofitsas I., Road construction elements (Στοιχεία Οδοποιίας), Ion Publications, Athens, 2001 (in Greek)
- 2. Apostoleris A., Road Construction I Theory and Practice (Οδοποιία Ι-Χαράξεις Θεωρία και Πρακτική), Apostoleris A. Publications, Athens 2013 (in Greek).
- 3. Mouratidis A., Road construction, The construction of road works (Οδοποιία, Η κατασκευή των Οδικών Έργων), University Studio Press, Athens, 2000 (in Greek).
- 4. Leonhardt F., Bridges, Giourdas Publications, 2000 (in Greek).
- 5. Koch W./Weidemann H., Bridge Construction Volumes A & B, Giourdas Publications, 1998 (in Greek).
- 6. Rusch H., Rectangular Slabs Calculation Tables, Giourdas Publications, 2000 (in Greek).
- 7. Anagnostopoulos A.G., Foundations with Piles (Θεμελιώσεις με Πασσάλους), Symeon Publications, 2004 (in Greek).
- Papazoglou N., Road Construction Works and BRIDGES Notes (Σημειώσεις Τ.Ε.Ο. και ΓΕΦΥΡΩΝ), TEI of Athens (in Greek).
- 9. Guidelines for the Seismic Design of Bridges, Circular E39/99 (ΔΜΕΟγ/o/884/24.12.1999 Υ.ΠΕ.ΧΩ.Δ.Ε.), Ministry of Infrastructure and Transport (in Greek).

10. Guidelines for the Seismic Isolation of Bridges, (2004), Υ.ΠΕ.ΧΩ.Δ.Ε. Ministry of Infrastructure and Transport (in Greek).

### Foreign Bibliography:

- 1. Wright P.H., Highway Engineering, 6th edition, John Wiley & Sons, 1996.
- 2. Mondorf P., Concrete Bridges, Taylor & Francis, 2006.
- 3. Terzaghi K. and Peck R.B., Soil Mechanics in Engineering Practice, 2nd edition, John Wiley, New York, 1967.
- 4. Bromhead E.N., The Stability of Slopes, 2nd edition, Blackie Academic and Professional, an imprint of Chapman & Hall, 1992.
- 5. DIN, Deutche Industrie Norm, Soil and Rock Anchors: Temporary Soil Anchors, Analysis, Structural Design and Testing, DIN 4125, 1972, 1976.
- 6. Cope R.J., Concrete Bridge Engineering, Taylor & Francis, 1987.
- 7. M.J.N.Priestley, F.Seible, G.M.Calvi (1996), "Seismic Design and Retrofit of Bridges", J Wiley & Sons