

10.5 CE1021 – Bridge Engineering

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CE1021	Semmester	10
COURSE TITLE	Bridge Engineering		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	WEEKLY TEACHING HOURS	CREDITS	
	4	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Special Background Course		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/PEY151/		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>The course is a first contact of students with the bridge construction which is one of the most complex and interesting areas of civil engineering. This course aims to cover the variety of subjects such as loading, analysis of static systems and bridge construction methods.</p> <p>After the course the student will be able to:</p> <ul style="list-style-type: none"> • Identifies and selects the appropriate bridges type. • Calculates actions on bridges • Analyze and mplement the design code regulations. • Know the technology and bridge construction methods. • Understand the details bearing bridges.

- Decide on the type of bridge foundation.

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

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Others...

Specifically, students will be able to:

- Perform analysis and desing of bridges according to Eurocodes
- Use the suitable analysis software to perform analysis and desing of bridges.
- Participate in a team of engenneers and express his opinion about the desing of the project.
- Execute an autonomous work in his private office for desinging or construction of structures
- Search, analysis and synthesis of data and information, using the necessary technologies.
- Decision Making.
- Autonomous work

(3) SYLLABUS

The content of the course is summarized below:

8. Introductory review. Description of design steps of infrastructure work.
9. Presentation of the part of bridge. Types of bridges.
10. Construction methods:
 - a. Classical method with formwork. In-situ construction on scaffolding or stationary falsework
 - b. Precast – prestressed beams
 - c. Traveling formwork above or below the deck (movable scaffolding or flying shuttering)
 - d. Horizontal incremental launching using steel nose (deck pushing system)
 - e. Balanced cantilever Construction
11. Traffic and other Loads in bridge
12. Modeling and simulation of bridges
13. Conceptual design of bridges
14. Bridge Construction Supervision and Inspection. Evaluation and Assessment Methods for Bridge Elements
15. Rehabilitation and Strengthening of Highway Bridge
16. Bridge Health Monitoring-Maintenance
17. Semester project

(4) TEACHING and LEARNING METHODS – EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face or / and distance learning				
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Teaching using ICT, Communication and Electronic Submission. Teaching using special software analysis				
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i>	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Activity</th> <th style="text-align: center;">Semester workload</th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">52</td> </tr> </tbody> </table>	Activity	Semester workload	Lectures	52
Activity	Semester workload				
Lectures	52				

<p>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.</p> <p>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</p>	Classwork	38
	Preparation for Project	25
	Personal Study	10
	Course total	125
<p>STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure</p> <p>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</p> <p>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</p>	<p>Language of evaluation: Greek</p> <p>Final written examination: 60%</p> <p>Preparation for the project: 40%</p>	

(5) ATTACHED BIBLIOGRAPHY

<p><u>Greek Bibliography:</u></p> <ol style="list-style-type: none"> 1. Sigalas I., Lectures notes NTUA, (In Greek). 2. Ermopoulos I. (2000). Steel and composite bridges, Editor Klidarithmos, (In Greek). 3. Vagias I., Iliopoulos A., Thanopoulos P., Design of composite bridge, Editor Klidarithmos, (In Greek).. <p><u>Foreign Bibliography:</u></p> <ol style="list-style-type: none"> 1. C. R. Hendy and D. A. Smith, Desingers guide to EN1992-2, Eurocode 2 : Desing of concrete structures, Part 2: Concrete bridges, Thomas Telford 2007. 2. Bridge Engineering Handbook, Second Edition: Fundamentals, Wai-Fah Chen and Lian Duan, CRC Press, Taylor & Francis Group, 2014. 3. Bridge Engineering Handbook, Second Edition: Superstructure Design, Wai-Fah Chen and Lian Duan, CRC Press, Taylor & Francis Group, 2014. 4. Bridge Engineering Handbook, Second Edition: Substructure Design, Wai-Fah Chen and Lian Duan, CRC Press, Taylor & Francis Group, 2014. 5. Bridge Engineering Handbook, Second Edition: Seismic Design, Wai-Fah Chen and Lian Duan, CRC Press, Taylor & Francis Group, 2014. 6. Bridge Engineering Handbook, Second Edition: Construction and Maintenance, Wai-Fah Chen and Lian Duan, CRC Press, Taylor & Francis Group, 2014. <p><u>Related academic journals:</u></p> <ol style="list-style-type: none"> 1. Journal of Bridge Engineering, ASCE 2. Bridge Structures, Assessment, Design and Construction, IOS Press 3. Structural Engineering International (SEI), 4. International Journal of Bridge Engineering 5. Structural Concrete, Journal of the fib 6. ACI Structural Journal 7. Earthquake engineering and structural dynamics 8. Earthquake and structures 9. Structural control and health monitoring 10. Engineering structures 11. Earthquake spectra 12. Journal of earthquake engineering
