

COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDER GRADUATE		
COURSE CODE	2306531	SEMESTER	6 th
COURSE TITLE	Reinforced Concrete II		
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
Lectures and classwork		4	7
Laboratory Exercises		3	
<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>	Specialization Course		
PREREQUISITE COURSES:	YES (Mechanics II)		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (official)		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English for ERASMUS students)		
COURSE WEBSITE (URL)	http://civil.teipir.gr/web/index.php?page=alias-41		

(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 the comprehension of the behavior of concrete and its use in structures, the ability to evaluate its properties through experimental procedures and the design of members and structures.

Upon completion of the course, students will have:

1. Knowledge of the behavior of reinforced concrete structures.
2. In-depth knowledge and critical understanding of theory and principles of structural design and calculation of reinforced concrete structures, since they could use new technologies and information systems in analysis and design of reinforced concrete structures.
3. Knowledge and skills in calculation of reinforced concrete structures.
4. Knowledge to put what they learn to solve practical problems of civil engineering
5. Ability to apply experimental procedures during design and construction process of a structure.
6. Ability to experimentally evaluate the mechanical properties of concrete, rate its quality and evaluate its strength using destructive and non-destructive techniques.
7. Knowledge and skills in evaluating key parameters as the ductility and strength of reinforced concrete members.
8. Skills to determine the need of structural repair and strengthening and knowledge of retrofitting techniques using resins and FRPs.
9. Background knowledge to apply what they learn in courses Repair and Strengthening and Prestressed Concrete.
10. Ability to develop personal responsibility and offer scientific opinion.
11. Ability to manage time in an appropriate manner.

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...

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Specifically, students will be able to perform:

Search, analysis and synthesis of data and information, using the necessary technologies.

Decision Making.

Autonomous work.

(3) Course Content

Theory

Beams, Columns, Strength of members with Bending and Axial loading. P-M diagrams. Biaxial bending. T-beams. Strength and deformation of members with Shear. Concrete confinement. Aspects of the seismic design of reinforced concrete structural elements (beams, columns, beam-column joints, structural walls). Buckling of reinforced concrete columns. Bond and anchorage: basic features of bond resistance, anchorage or development bond, types of anchorage. Design of concrete members under seismic loads.

Lab

Physical properties of Aggregates, Los Angeles testing, Properties and Workability of Cement, Elastic properties of Concrete, σ - ϵ diagram. Destructive and non-destructive methods for evaluation of concrete Strength. Flexural Behavior of Fiber Reinforced Beams. Theoretical Evaluation of Flexural Stiffness, Experimental determination of ultimate capacity and ductility ratio of Reinforced Concrete Beams. Repair and Strengthening techniques for Rehabilitation of Lightly Reinforced Concrete Beams with FRPs and Cement mortars.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face lectures, laboratories	
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 METHODS <i>The manner and methods of teaching are described in detail.</i> <i>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.</i> <i>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</i>	Activity	Semester workload
	Lectures	39
	Classwork	13
	Laboratory Exercises	39
	Preparation for writing laboratory reports-homework	20
	Preparation for Project	20
	Personal Study	44
	Course total	175
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>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</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	<p>Language of evaluation: Greek</p> <p><u>Theory:</u> Final written examination: 48% Preparation for Project: 12%</p> <p><u>Laboratory:</u> Final written examination: 40%</p>	

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(5) ATTACHED BIBLIOGRAPHY

1. Chouliaras Ioannis (2003). Reinforced Concrete Constructions: According to Greek Reinforced Concrete Rule 2000, Papatirou Publications, Athens (in Greek).
2. Gros G. (2004), Reinforced Concrete according to Greek Reinforced Concrete Rule 2000. Comparison with Eurocode 2 and DIN 1045/2001. Materials – Design – Structures, Athens: Symmetria Publications (in Greek).
3. Georgopoulos Th., (2004), Reinforced Concrete (vol. A), Pavlos Georgopoulos Publications (in Greek).
4. Georgopoulos Th., (2004), Reinforced Concrete (vol. B), Pavlos Georgopoulos Publications (in Greek).
5. Konstantinidis A., (1994), Reinforced Concrete Applications – Vol A, Athens: Π Systems International Publications (in Greek).
6. Konstantinidis A., (1994), Reinforced Concrete Applications – Vol B, Athens: Π Systems International Publications (in Greek).
7. Demakos C., Lecture Notes for Reinforced Concrete Laboratory.
8. Brooker, O. et. al. (2006). "How to Design Concrete Structures using Eurocode 2". The Concrete Centre.
9. Goodchild, C. H. (2009). "Worked Examples to Eurocode 2". Volume 1. The Concrete Centre.
10. Mosley, B., Bungey, J. & Hulse R. (2007). "Reinforced Concrete Design to Eurocode 2". 6th Edition. Palgrave McMillan.
11. Narayanan, R. S., & Goodchild, C. H. (2006). "Concise Eurocode 2". The Concrete Centre.