(B) Course information in English

General course information:

Course title:	**Reinforced Concrete Design I**	**Course code:**	**CE06_S05**
Credits:	5	**Work load (hours):**	160
Course level:	Undergraduate ☒	Graduate ☐	
Course type:	Mandatory ☒	Selective ☐	
Course category:	Basic ☒	Orientation ☐	
Semester:	6th	**Hours per week:**	4

Course objectives (capabilities pursued and learning results):

The course objective is the behavior and ultimate strength design of prismatic reinforced concrete members (beams and columns) under normal stresses (bending moment and axial force) and shear stresses (shear force and torsional moment). The course provides the tools for the ultimate strength design of R/C beams and columns under a possible seismic loading.

Prerequisites:

1. Mechanics I, II
2. Construction Materials
3. Structural Analysis I

Instructor's data:

Name:	Theodoros Xrisanidis
Level:	Teaching Staff
Office:	
Tel. – email:	email: theodoros_gr@yahoo.com
Other tutors:	-

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	Preparation
1	Materials: concrete, steel	**4**	**3**
2	Behavior of a reinforced concrete member - constitutive laws for concrete and steel	**4**	**3**
3	Load combinations – maximum/minimum M, V. Ultimate strength design: concepts and code specifications.	**4**	**3**
4	Design under seismic loading – Factor of seismic response and ductility	**4**	**4**
5	Ultimate strength design for normal stresses due to uniaxial bending (M) and axial force (N). Equations of equilibrium/equivalence between internal forces and external actions	**4**	**3**
6	Under-reinforced, over-reinforced and balanced design of RC beams with rectangular cross-section. Design of rectangular RC beams with single (only tension reinforcement) or double steel (tension and compression reinforcement)	**4**	**3**
7	Ultimate strength design of T-beams (effective width, balanced steel reinforcement ratio). LAB: 4-point bending test of R/C beam failing in flexure	**4**	**3**
8	Ultimate strength design for reinforced concrete columns under uniaxial bending and axial force	**4**	**3**
9	Ultimate strength interaction diagrams M-N (uniaxial bending and axial force) – Lateral confinement	**4**	**3**
10	Ultimate strength design for rectangular columns under biaxial bending and axial force (M_x-M_y-N) and interaction diagrams) - Columns with low shear-length ratio	**4**	**4**
11	Ultimate strength design for beams under shear (V) (mechanisms, cross-section, transverse reinforcement - stirrups)	**4**	**3**
12	Ultimate strength design for beams under shear (V) (critical regions, design for shear under seismic loading – X steel reinforcement)	**4**	**3**
13	Ultimate strength design for beams under pure torsion (T) (mechanism, cross-section, transverse and longitudinal steel reinforcement)	**4**	**4**
14	Ultimate strength design for beams under combined torsion (T), shear (V) and bending (M) (transverse and longitudinal steel reinforcement, construction details)	**4**	**3**

Additional hours for:			
Class project	**Examinations**	**Preparation for examinations**	**Educational visit**
25	4	30	

Suggested literature:
1. Greek Code for the Design of Reinforced Concrete Structures (2000) 2. Eurocode 2: Part 1-1 (EN1992-1-1) 3. Eurocode 8: Part 1 (EN1998-1) 4. Greek Code for Aseismic Design 5. Nilson, A., “Design of Reinforced Concrete Structures” 6. Class notes for RC I 7. Fardis M., «A course on Reinforced Concrete» *8.* Penelis/Stylianidis/Kappos/Ignatakis, «Reinforced Concrete Structures»

Teaching method *(select and describe if necessary -* **weight***):*		
Teaching	☒	75%
Seminars	☐	-
Demonstrations	☐	-
Laboratory	☒	3%
Exercises	☒	20%
Visits at facilities	☒	2%
Other *(describe):* ……	☐	-
Total		100%

Evaluation method *(select)-* **weight:**				
	written	*%*	*Oral*	*%*
Homework	☐		☐	
Class project	☒	25	☒	5
Interim examination	☐		☐	
Final examinations	☒	70	☐	
Other *(describe):* ……	☐		☐	