

## **(B) Course information in English**

### **General course information:**

<b>Course title:</b>	Prestressed Concrete Design	<b>Course code:</b>	<b>CE08_S05</b>
<b>Credits:</b>	5	<b>Work load (hours):</b>	160
<b>Course level:</b>	Undergraduate <input checked="" type="checkbox"/>	Graduate	<input type="checkbox"/>
<b>Course type:</b>	Mandatory <input checked="" type="checkbox"/>	Selective	<input type="checkbox"/>
<b>Course category:</b>	Basic <input type="checkbox"/>	Orientation	<input checked="" type="checkbox"/>
<b>Semester:</b>	9 <sup>th</sup>	<b>Hours per week:</b>	4
<b>Course objectives (capabilities pursued and learning results):</b>			
Behavior and design of determinate and indeterminate prestressed concrete structures under serviceability conditions and ultimate strength (flexural and shear).			
<b>Prerequisites:</b>			
1. Design of Reinforced Concrete II 2. Structural Analysis II			

### **Instructor's data:**

<b>Name:</b>	Philip C. Perdikaris
<b>Level:</b>	Professor
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<b>Other tutors:</b>	-

**Specific course information:**

<b>Week No.</b>	<b>Course contents</b>	<b>Hours</b>	
		<b>Course attendance</b>	<b>Preparation</b>
1	Materials: concrete, prestressing steel	4	2
2	Basic concepts and applications of prestressed concrete (P/C), prestressing methods, partial prestressing, flexural concrete stresses	4	3
3	Equivalent loads due to prestressing, pressure-line, load balancing	4	3
4	Immediate losses of prestressing force (friction, elastic shortening, tendon slippage)	4	3
5	Time-dependent losses of prestressing force (creep and shrinkage of concrete, steel stress relaxation)	4	3
6	Preliminary design of P/C beams based on serviceability conditions and allowable stresses (constant and variable tendon eccentricity)	4	3
7	Preliminary design of P/C beams (concrete section shape selection and dimensions, tendon profile)	4	3
8	Preliminary design of P/C beams (minimum prestressing force, tendon eccentricity, Magnel diagram)	4	3
9	Preliminary design of P/C beams (allowable tendon profile region, cracking, pressure line)	4	3
10	Indeterminate P/C structural members: equivalent loads, external reactions, static (primary) and hyperstatic (secondary) bending moment due to prestressing	4	3
11	Indeterminate P/C structural members: final bending moment due to prestressing, linear transformation and concordant tendon profile, pressure line	4	3
12	Ultimate strength design of P/C beams against flexure	4	3
13	Ultimate strength design of P/C beams against shear	4	3
14	Anchorage zone design	4	2

Additional hours for:			
Class project	Examinations	Preparation for examinations	Educational visit
35	4	20	

**Suggested literature:**

1. Greek Code for the Design of Reinforced Concrete Structures (2000)
2. Eurocode 2: Part 1-1 (EN1992-1-1)
3. Class notes for Prestressed Concrete
4. Nilson, A., "Design of Prestressed Concrete"
5. Fardis M., "A course on Prestressed Concrete"

**Teaching method (select and describe if necessary - weight):**

Teaching	<input checked="" type="checkbox"/>	80%
Seminars	<input type="checkbox"/>	-
Demonstrations	<input type="checkbox"/>	-
Laboratory	<input type="checkbox"/>	-
Exercises	<input checked="" type="checkbox"/>	18%
Visits at facilities	<input checked="" type="checkbox"/>	2%
Other (describe): .....	<input type="checkbox"/>	-
Total		100%

**Evaluation method (select)- weight:**

	<u>written</u>	<u>%</u>	<u>Oral</u>	<u>%</u>
Homework	<input type="checkbox"/>	-	<input type="checkbox"/>	
Class project	<input checked="" type="checkbox"/>	25	<input checked="" type="checkbox"/>	5
Interim examination	<input type="checkbox"/>		<input type="checkbox"/>	
Final examinations	<input checked="" type="checkbox"/>	70	<input type="checkbox"/>	
Other (describe): .....	<input type="checkbox"/>		<input type="checkbox"/>	