

# Civil Engineering for Mitigation of Risk from Natural Hazards

## Course: Reinforced Concrete Structures

A.y.: 2023-2024

Lecturers: Boyan Mihaylov and Gabriele Guerrini

Date: 24/10/2023 – 24/11/2023

Classroom: Eucentre-1

### Course schedule

Week	Date	Lecture hours		Tutorial hours		Subject	Tot h
		From ____ To ____		From ____ To ____			
1	23/10	-		-		-	-
	24/10	9:00-12:00		13:30-15:30		Ch 1 Strut-and-tie design of slender beams/members	5
	25/10	9:00-12:00		13:30-15:30		Ch 2 Design for torsion -> A1 out	5
	26/10	-		-		-	-
	27/10	9:00-12:00		13:30-15:30		Ch 3 Design of deep beams	5
2	30/10	9:00-12:00		13:30-15:30		Ch 4 Design of joints and connections -> A1 in / A2 out	5
	31/10	9:00-12:00		13:30-15:30		Ch 4 Design of joints and connections	5
	01/11	-		-		-	-
	02/11	9:00-12:00		13:30-15:30		Ch 5 Design of wall structures -> A2 in / A3 out	5
	03/11	9:00-12:00		13:30-15:30		Ch 5 Design of wall structures	5
3	06/11	9:00-12:00		13:30-15:30		Ch 6 Axial behavior of prestressed members -> A3 in	5
	07/11	9:00-12:00		13:30-15:30		Ch 7 Flexural behavior of prestressed members -> A4 out	5
	08/11	-		-		-	-
	09/11	9:00-12:00		13:30-15:30		Ch 8 Design of prestressed beams	5
	10/11	9:00-12:00		13:30-15:30		Ch 8 Design of prestressed beams -> A4 in	5
4	13/11	9:00-12:00		13:30-15:30		Ch 9 Calculation of prestress losses	5
	14/11	9:00-12:00		13:30-15:30		Ch 10 Design of slabs -> A5 out	5
	15/11	-		-		-	-
	16/11	9:00-12:00		13:30-15:30		Ch 10 Design of slabs	5
	17/11	9:00-12:00		13:30-15:30		Ch 11 Design of foundations -> A5 in	5
5	20/11	TBD		TBD		Possible make-up hours/review session	TBD
	21/11	-		-		-	-
	22/11	-		-		-	-
	23/11	-		-		-	-
	24/11		9:00-13:00			Final exam	4

Note: The separation of the classes into lectures and tutorials is not strict and the two will be alternated depending on the needs of the class. "A# out/in" indicate handing out/turning in dates of assignment #.

### **Brief Contents Description and Course Syllabus**

The main objective of the course is to develop knowledge and skills necessary for the design of a variety of important reinforced and prestressed concrete members and structures as listed in the course content. The focus is placed on using fundamental principles (flow of forces, compatibility of deformations, stress-strain relationships, equilibrium) to solve different design problems from 1D (beams and girders) to 3D members and structures (spread footings, pile caps and wall systems). In this manner, the course develops a fundamental understanding of structural design which the students can apply to any other type of concrete structures not covered in the syllabus.

To maximize the learning outcome, the course will use a variety of different teaching methods. The classes will include a combination of slide presentations, blackboard lectures, solved demonstration problems, individual and group work of the students for solving challenging problems, video materials, and critical analysis of reading materials in the classroom. The students will participate actively by using first principles to solve analysis and design problems which are aimed at providing an important insight into the behavior of concrete structures. They will be guided towards the final solution by solving intermediate problems with increasing complexity.

The evaluation will be based on homework assignments (30%) and a written final exam (70%). The final exam will consist of two parts: exercises (open book) and theory (closed book); only paper material and traditional calculators will be allowed during the open book exercise part, no electronic or communication devices.