University of Pavia

IUSS School of Advanced Studies

Civil Engineering for Mitigation of Risk from Natural Hazards

Course: ***Seismic Design of Steel Structures***
a.y.: 2020/2021
Lecturer: Gaetano Della Corte
Date: 19/10/2020 – 20/11/2020
Classroom:

Course schedule

Week #	Day, Date	Time	Lecture content	Homework
1	Wednesday, 21	10:00-13:00	Basics of production and engineering properties of steel	
	Thursday, 22	10:00-13:00	Types and anatomy of seismic resistant steel structures	
	Friday, 23	10:00-13:00	CBFs: Characterizing the axial force-deformation response of braces	
		14:30-16:30	Calculation tutorials	HW1 set
2	Monday, 26	10:00-13:00	CBFs: Capacity design of beams	
		14:30-16:30	Design tutorials	HW1 due, HW2 set
	Wednesday, 28	10:00-13:00	CBFs: Capacity design of columns	
		14:30-16:30	Design tutorials	HW2 due, HW3 set
	Thursday, 29	10:00-13:00	CBFs: Capacity design of connections	
		14:30-16:30	Design tutorials	HW4 set

3	Tuesday, 03	10:00-13:00	Moment resisting frames (MRFs): Types and basic aspects of analysis models	HW3 and HW4 due
		14:30-16:30		
	Wednesday, 04	10:00-13:00	MRFs: Characterizing the moment-rotation response at plastic hinges	
		14:30-16:30	Calculation tutorials	HW5 set
	Friday, 06	10:00-13:00	MRFs: Capacity design of beams	
		14:30-16:30	Design tutorials	HW5 due, HW6 set
4	Tuesday, 10	10:00-13:00	MRFs: Capacity design of columns	
		14:30-16:30	Design tutorials	HW6 due, HW7 set
	Wednesday, 11	10:00-13:00	MRFs: Capacity design of joints – Part I	
		14:30-16:30	MRFs: Capacity design of joints – Part II	
	Thursday, 12	10:00-13:00	Fundamentals of EBFs and BRBFs	HW7 due
	Tuesday, 17		Final exam	

Brief Contents Description and Course Syllabus: ...

The course provides information on seismic design of steel structures for buildings. First, the types of steel structures for seismic resisting systems are introduced, along with a description of relevant engineering properties of the steel material. Subsequently, specific information is provided on the seismic design and analysis of two structural types: (i) concentrically braced frames (CBFs) and (ii) moment resisting frames

(MRFs). Eventually, fundamental issues for the seismic response of alternative structural systems (e.g., eccentrically braced frames, buckling-restrained braced frames) are introduced and discussed.

Material for studying

The lecturer will provide copy of the slides and calculation tutorials presented during the course. In addition, interested readers might consult the following book:

Michel Bruneau, Chia-Ming Uang, Rafael Sabelli, *Ductile design of Steel Structures*, Mac Graw Hill, 2011 (2nd Edition)

Software

1) MathCAD, Excel or Python scripts

Grading

Homeworks: 50 %
Final exam: 50 %