UNIVERSITÀ DI PAVIA

Anno Accademico 2021/2022

STRUCTURAL ENGINEERING

Enrollment year	2019/2020
Academic year	2021/2022
Regulations	DM270
Academic discipline	ICAR/09 (CONSTRUCTION TECHNIQUES)
Department	DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE
Course	CIVIL AND ENVIRONMENTAL ENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	3°
Period	1st semester (27/09/2021 - 21/01/2022)
ECTS	12
Lesson hours	116 lesson hours
Language	Italian
Activity type	WRITTEN AND ORAL TEST
Teacher	MAGENES GUIDO (titolare) - 4 ECTS GRAZIOTTI FRANCESCO - 4 ECTS PENNA ANDREA - 4 ECTS
Prerequisites	The course requires a complete knowledge of the contents of the course of Structural Mechanics (scienza delle costruzioni)
Learning outcomes	The course completes the course of Structural Mechanics (scienza delle costruzioni) for what regards a design and operational approach to the analysis of elastic frames structures. The theory of reinforced concrete will be then presented, using the limit state approach, making reference to the prescriptions of the European codes (EC2 and Model Code of CEB), with also a (limited) discussion of the traditional methods based on allowable (working) stress. In the third part of the course, the design of current steel structures will be faced, by critically illustrating the requirements of the Italian and European codes and highlighting in particular the issues related with buckling phenomena.

Course contents	Elements of structural theory - Basics of beam theory - Operational methods for the linear analysis of frame structures. Force method. Displacement method. The foundations of structural design - Objectives of structural design. Design for structural reliability: performance requirements in terms of comparison of capacity and demand – Definition of ultimate and serviceability limit states. - Randomness of the involved quantities. Introduction to probabilistic methods of level 1 and 2 – Semiprobabilistic limit state method with partial coefficients. - Design values of the different quantities. Classification of the actions on the constructions. Load combinations at serviceability and ultimate limit states. Reinforced concrete - Basic properties of concrete: constitutive laws, creep, shrinkage, bonding. - Main hypotheses of the reinforced concrete theory - Verifiche in condizione di esercizio: verifiche delle tensioni e della fessurazione. - Safety checks at the serviceability limit states: stress and cracking verifications. - Ultimate limit state section verification and design for normal stress. Ductility in the ultimate behavior of r.c. sections. - Verification and design at the ultimate limit state for shear. - Buckling verification Steel structures - General criteria for the limit state and allowable stress verification of the material. Strength and deformability safety checks. - Types of connections - Verification of welded and bolted connections. - Buckling verifications of compressed elements and elements subjected to compression and bending.
Teaching methods	Lectures (hours/year in class): 55 Practical lectures (hours/year in class): 70 Practical activities (hours/year in class): 0
Reccomended or required readings	Notes provided by the Professor, available on the Kiro platform. Further suggested readings (in Italian): R.Giannini”Teoria e tecnica delle costruzioni”, CittàStudi Edizioni,2011 E.Cosenza, G.Manfredi, M.Pecce “Strutture in cemento armato”, Hoepli, 2008 C.Bernuzzi, “Progetto e verifica delle strutture in acciaio”, Hoepli, 2011
Assessment methods	The exam will be written, and will consist of three partes: one on the solution of simple planar frames, one on r.c. structures, ne on steel structures. A part of the course concerning reinforced concrete structures is covered by an oral exam.
Further information	-

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