



COURSE DESCRIPTION

LABORATORY OF CONSTRUCTION TECHNIQUE

SSD: TECNICA DELLE COSTRUZIONI (ICAR/09)

DEGREE PROGRAMME: ARCHITETTURA (N14)
ACADEMIC YEAR 2022/2023

COURSE DESCRIPTION

TEACHER: LANDOLFO RAFFAELE
PHONE: 081-7683340 - 081-7683480 - 081-2538052
EMAIL: raffaele.landolfo@unina.it

GENERAL INFORMATION ABOUT THE COURSE

INTEGRATED COURSE: NOT APPLICABLE
MODULE: NOT APPLICABLE
CHANNEL: 01 Cognome A - Z
YEAR OF THE DEGREE PROGRAMME: IV
PERIOD IN WHICH THE COURSE IS DELIVERED: SEMESTER I
CFU: 12

REQUIRED PRELIMINARY COURSES

Structural Mechanics

PREREQUISITES

Fundamental concepts of Structural Mechanics. Given the applicative nature of the course, basic computer knowledge of the Microsoft Office package (Word, Excel) and CAD programs (AutoCAD), available free of charge for students of the University of Naples Federico II, are recommended.

LEARNING GOALS

The main goal of the course is to provide the basis of a methodology for the analysis and design of structures, in accordance with current national and international standards. The issues are related to the conceptual design, design and verification of simple structures made of typical construction materials. Particular attention will be devoted to the topic of seismic risk reduction strategies, with reference to the design of new buildings and to the vulnerability assessment and evaluation of

existing ones.

EXPECTED LEARNING OUTCOMES (DUBLIN DESCRIPTORS)

Knowledge and understanding

During the course, through lectures, seminars and laboratory activities, the student acquires the knowledge required to develop the conceptual design and calculation of structures as integrated elements of the elaboration of the architectural project in the various fields of its application. He/she also understands the interconnections with the other disciplines that contribute to the formation of the architectural project.

Applying knowledge and understanding

The student develops the ability to apply the theoretical and methodological knowledge related to the structural aspects of the architectural project and to produce general and simple design drawings by comparing themselves with different degrees of in-depth analysis of the architectural project, at different scales and in different areas of its application.

COURSE CONTENT/SYLLABUS

Basis of structural design

Introduction

Objectives and methods for structural design

Methods for structural safety

Actions on constructions and regulatory framework

Units of measure and analysis of loads

Steel members

Materials and products

Strength and stability verifications in the elastic field

The plastic theory for steel members: members in tension and compression

The plastic moment and the interaction domains

The stability of compressed members

Members in bending and in combined bending and axial force

Reinforced concrete members

Materials, components and behavioural phases

The elastic analysis in the cracked phase

The ultimate limit state for normal stresses

The M-N interaction domains and the stress-block method

Ultimate limit state for shear stresses

Serviceability limit states: cracking and deformation

Structural systems: typologies and classification

The typology of the elements

Constraints and their classification

Typological classification of beam systems

The classification of structural systems

The buildings

Earthquakes and seismic risk

Theory of plate tectonics

Seismic waves

Earthquake measuring instruments

The location of the earthquake

The measure of the earthquake

The seismic risk

Fundamentals of Structural Dynamics

Dynamics of structures

The single-degree-of-freedom system

Static approach and dynamic approach

The response spectrum

The single-degree-of-freedom system in reality

Elastic systems with several degrees of freedom

General principles of seismic design

Earthquake-resistant systems and structural regularity

Seismic design strategies

Ductility and behaviour factor

General design criteria

Capacity design

Verifications at DLS

Design criteria for steel buildings in seismic areas

Structural typologies

Ductility of steel structures

Behaviour factors and general rules

Frame structures

Structures with concentric bracings

Structures with eccentric bracings

Design criteria for reinforced concrete buildings in seismic areas

Structural typologies

The ductility of reinforced concrete structures

Behaviour factors

Design and verification of structural elements

Beams and columns

Beam-to-column joints

Existing buildings in the seismic areas

Prerogatives and pathologies of existing buildings

Structural identification and knowledge levels

Security assessment

Strategies of interventions, upgrading improvement and local interventions
Intervention strategies for the reduction of vulnerability

READINGS/BIBLIOGRAPHY

- Lectures given during the course
- Additional teaching material derived from lectures available at the following link:
<http://www.federica.unina.it/corsi/laboratorio-di-tecnica-delle-costruzioni/> .
- References for further information on covered topics:
 - D.L. Schodek, Strutture, Patron Editore, 2012
 - M. Mezzina, Fondamenti di Tecnica delle Costruzioni, Città Studi Edizioni, seconda edizione 2021
- Standards:
 - Ministero delle Infrastrutture e dei Trasporti. Aggiornamento delle Norme Tecniche delle Costruzioni –supplemento ordinario n. 8, pubblicata sulla Gazzetta Ufficiale n. 42 del 20.02.2018.
 - Circolare 21 gennaio 2019, n. 7 C.S.LL.PP. Istruzioni per l'applicazione dell'«Aggiornamento delle "Norme tecniche per le costruzioni"» di cui al decreto ministeriale 17 gennaio 2018.
- Scientific papers dealing with covered topics

TEACHING METHODS OF THE COURSE (OR MODULE)

The teaching activity is organized into two modules and includes a theoretical and an applied part. The first module, essentially theoretical in nature, develops and integrates the contents of the previous courses in the structural area in relation to problems connected with materials and construction technologies. The exercises are numerical and they involve design and verification of simple structural elements. The second module, mainly of a design nature, is focused on the study of the behaviour of more complex structural systems and on design strategies in seismic areas. In this case, the application part is aimed at the executive design of recurring structural typologies in professional practice. The educational offer also includes various seminars on specific topics of structural engineering.

EXAMINATION/EVALUATION CRITERIA

a) Exam type

- Written
- Oral
- Project discussion
- Other

In case of a written exam, questions refer to

- Multiple choice answers
- Open answers
- Numerical exercises

b) Evaluation pattern