



Dipartimento di Architettura e Territorio – dArTe

Corso di Studio in Architettura quinquennale – Classe LM-4

Degree course	Corso di Studio in Architettura quinquennale – Classe LM-4
Course code	
Lecturer	Raffaele Pucinotti – Assistant Professor PhD
Course name	Analysis and Design of Building Structures
Disciplinary area	
Disciplinary field of science	08/B3 – ICAR09
University credits - ECTS	6
Teaching hours	60
Course year	4
Semester	II

Synthetic description and specific course objectives

The main purpose of the course is to provide the knowledge and basic skills in the design and verification of safety of simple structures built with different construction materials in accordance with the main national and international standards. The course providing students with the tools to identify and understand the structural functioning of existing buildings and the ability to optimize the choice of the structural system as a function of architectural complexity of new buildings.

Course entry requirements

Students are expected to have completed all prerequisites consisting in the principles of statics, rigid body equilibrium and Mechanics of Materials.

Course programme

This course introduces students to the analysis and design of building structures and to the concept of structural safety and prepares students to analyze and design structural elements and systems according to the Italian and European standard. The course starts with the analysis and design of reinforced concrete and steel structures culminating in the consideration of building systems design. The quantitative understanding of interior forces and bending moments, stresses, and deformations are an integral part of the learning process throughout the course. Moreover, both destructive (drilling cores) and nondestructive evaluation of concrete structures and assessment of existing buildings will be introduced.

The course moreover offers addresses the analysis and design of structural elements such as trusses, continuous beams, rigid and braced frames. It also introduces seismic design, the use of structural elements in a building context and simplified methods of analysis of indeterminate structures.

In the course, simplified methods of quantitative analysis will be introduced.

Expected results

Understanding of the Limit State design philosophies and behavior of structure:

2. Ability to analyze and design of tension members.
3. Ability to analyze and design of columns.
4. Ability to analyze and design of beams.
5. Ability to analyze and design of beam-column joints.
6. Ability to analyze and design of simple bolted and welded connections.

7. Ability to design steel framing system and connections of a building in a team setting.
8. Familiarity with reinforced concrete and structural steel fabrication process and construction through field trip and/ or speaker presentation.
9. Familiarity with professional and ethical issues and the importance of lifelong learning in structural engineering.

Course structure and teaching

Lectures (*hours/year in lecture theatre*): 45

Practical class (*hours/year in lecture theatre*): 10

Practical / Workshops (*hours/year in lecture theatre*):5

Student's independent work

Ability to perform analysis and design of members and connections:

2. Ability to design reinforced concrete and steel structural systems.
3. Familiarity with professional and contemporary issues.
4. Ability to assessing a reinforced concrete existing structure.

Assignment 1: Students designing a floor in brick and cement.

Assignment 2: Students designing a destructive and nondestructive testing campaign of an existing building.

Testing and exams

The examination includes discussion of assignments and assessment of skills acquired through an oral examination.

Suggested reading materials

1. Cosenza E., Manfredi G., Pecce M., *Strutture in Cemento Armato*, Hoepli, 2010;
2. Raffaele Pucinotti, *Patologia e diagnostica del cemento armato*, Dario Flaccovio Editore (2006).
3. Bursi Oreste S.; Pucinotti Raffaele; Zanon Gabriele, *Progettazione di Giunzioni e Strutture Tubolari in Acciaio*, Dario Flaccovio Editore (2012).
4. Lecture notes provided by the teacher.