

# ENGINEERING FOR SAFETY OF CRITICAL INDUSTRIAL AND CIVIL

(Lecce - Università degli Studi)

## Teaching STRUCTURAL SAFETY and Resilience of industrial and civil infrastructures

GenCod A007224

**Owner professor** Maria Antonietta AIELLO

**Reference professors for teaching** Maria Antonietta AIELLO, GIANNI BLASI

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**SSD code** ICAR/09

**Reference course** ENGINEERING FOR SAFETY OF CRITICAL INDUSTRIAL AND

**Course type** Laurea Magistrale

**Credits** 9.0

**Teaching hours** Front activity hours: 81.0

**For enrolled in** 2024/2025

**Taught in** 2024/2025

**Course year** 1

**Language** ENGLISH

**Curriculum** INDUSTRIAL ENGINEERING SYSTEMS

**Location** Lecce

**Semester** First Semester

**Exam type** Oral

**Assessment** Final grade

**Course timetable**  
<https://easyroom.unisalento.it/Orario>

### BRIEF COURSE DESCRIPTION

The course covers fundamental concepts of structural safety for critical civil and industrial infrastructures. Risk assessment and emergency management are discussed, using hazard-vulnerability-exposure analysis approaches.

Emphasis is placed on issues related to structural vulnerability, with the aim of providing insights into safety management for critical infrastructures. This includes understanding risk scenarios, as well as risk mitigation techniques.

The topic of infrastructure resilience is explored through discussions on structural robustness assessment and evaluation criteria.

Additionally, basic knowledge is provided about structural maintenance and diagnostic for prevention and emergency management.

Lastly, the course addresses the seismic vulnerability assessment of critical non-structural components, whose operation can be crucial during emergencies

### REQUIREMENTS

Fundamental concepts on structural mechanics

### COURSE AIMS

- Understanding the fundamental principles of structural safety and resilience
- Acquiring knowledge on analysis and design methods to enhance reliability of infrastructures in case of extreme events
  - Developing practical skills in risk and vulnerability assessment, as well as maintenance planning to enhance safety and resilience of infrastructures

### TEACHING METHODOLOGY

In class and on-site practice sessions; theory lessons

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ASSESSMENT TYPE                      Oral exam

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ASSESSMENT SESSIONS              Dates will be available on the website

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OTHER USEFUL INFORMATION      Possible master's degree thesis:

- Seismic vulnerability assessment of existing bridges through rapid visual screening methods.
- Advanced numerical analysis of industrial structures and infrastructures.
- Development of risk mitigation methods for industrial structures and infrastructures.
- Maintenance intervention design for industrial structures and infrastructures

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## FULL SYLLABUS

- Introduction – Critical civil and industrial Infrastructures
- Risk and Emergency Management
- Structural Safety
- Structural Resilience
- Degradation of Construction Materials in critical Infrastructures
- Structural typology
- Risk Assessment Methods for Infrastructures
- Modelling and Simulation of Structural Response
- Practice lesson: Numerical Modelling
- Brief introduction to Structural Dynamics
- Practice lesson: Structural dynamics
- Accelerograms and Response Spectra
- Seismic design of Infrastructures
- Exceptional actions
- Practice lesson: Seismic design
- Non-Structural Elements
- Structural Strengthening Systems design
- Loss Analysis

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## REFERENCE TEXT BOOKS

- A.K. Chopra – Dynamics of structures – Pearson
- M. J. N. Priestley et al. – Seismic Design and Retrofit of Bridges – Wiley-Interscience
  - Jim Zhao, D. Tonias - Bridge Engineering: Design, Rehabilitation, and Maintenance of Modern Highway Bridges - McGraw Hill
  - E.N. Farsangi et al. - Reliability-Based Analysis and Design of Structures and Infrastructure – CRC Press
- Eurocode 2: Design of concrete structures – European Standard
- Eurocode 8: Design of structures for earthquake resistance – European Standard