TIME TABLE

TIME	Monday, July 20	Tuesday, July 21	Wednesday, July 22	Thursday, July 23	Friday, July 24
09:00 - 09:50	Ospina	Lai	Habets	Ospina	Cecioni
10:00 - 10:50	Lai	Lai	Habets	Ospina	Cecioni
11:10 - 12:00	Frandsen	Lai	Percher	Ospina	Habets
12:10 - 13:00	Frandsen	Lai	Percher	Ospina	Bozzoni
14:30 - 15:20	Frandsen	Percher	Percher	Ospina	Bozzoni
15:30 - 16:20	Frandsen	Percher	Percher	Ospina	Rodriguez-Plata
16:40 - 17:30	Ospina	Habets	Percher	Cecioni	Rodriguez-Plata
17:40 - 18:30	Ospina	Habets	Ospina	Cecioni	Closing

COURSE VENUE AND REGISTRATION

The course will be held at the University of Pavia, in Pavia (Italy), a charming medium sized town situated 40 km south of Milan, renown worldwide for its research contributions in the field of earthquake engineering, as well as for being also internationally for one of the world's oldest academic institutions. In fact, the University of Pavia was founded in 1361 and until the 20th century was the only university in the region of Lombardy. Today it hosts more than 23,000 students including many from foreign countries.
The University of Pavia also hosts the head office of the Eucentre Foundation. Founded in 2005, Eucentre is a private organization that pursues a mission of research, training and service provisions in the field of earthquake engineering. Eucentre has an important asset of experimental labs consisting of shaking tables the largest of which is currently the most powerful earthquake simulator in Europe.
The registration fee is €800,00 +22% of Taxes (IVA). Participation in the course will be limited to 50 attendees. Reservations will be made on a first-come, first-served basis. Applicants can register at the course via the website https://www.eucentre.it/seismic-design-of-port-structures-course/ than **May 31, 2026**.

ACCOMMODATION

The town of Pavia has a number of accommodation facilities to host the participants. A list of hotels and B&B is available at the link https://www.eucentre.it/seismic-design-of-port-structures-course. Please note that several conferences and winter schools are scheduled in town in the month of February, therefore the participants interested in attending the course are strongly encouraged to book the accommodation in advance.

HOW TO REACH US

The Eucentre Foundation in Pavia is located in the northwestern part of the town. The address is: Via Adolfo Ferrata, 1 – 27100 Pavia (Italy).

From the airport: There are three international airports close to Pavia. Milan Linate is the closest at 50 km, Milan Malpensa is at 90 km and Orio al Serio (Bergamo) is found at 100 km.

Public transportation: A regular commuter train service is available every 30 minutes from Milan Rogoredo railway station to Pavia. There are two bus lines connecting Pavia's railway central station to the Eucentre Foundation: bus n. 3 and bus n. 6.

By car: From Milan take the highway A7 Milan-Genoa, exit 'Pavia Nord-Bereguardo'. Then continue for about 10 km and take the exit at Pavia Centro. Turn left, pass the second roundabout and turn into the first entrance on the right, onto the Eucentre parking lot.

For further information please contact:
EUCENTRE Foundation
Via Adolfo Ferrata, 1 - Pavia 27100 (Italy)
Phone: +39 0382.5169811
E-mail: corsi@eucentre.it
Web: https://www.eucentre.it/seismic-design-of-port-structures-course

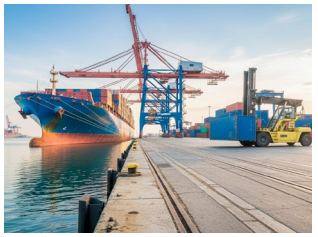
EUCENTRE
FOR YOUR SAFETY.

UNIVERSITÀ DI PAVIA
Dipartimento di Ingegneria Civile e Architettura

International Intensive Course on

SEISMIC DESIGN OF PORT STRUCTURES

Pavia (Italy)
July 20 – 24, 2026






COURSE OBJECTIVES AND CONTENTS

Ports are critical components of trading and intermodal transportation systems worldwide. They serve a pivotal role in enabling international trade, which underpins the global economy and fosters mutual interdependence among countries. **Disruptions to port operations** can have far-reaching consequences for national economies, security, and societal well-being. This has been dramatically demonstrated in recent and past **earthquakes** (e.g., Port-au-Prince, Haiti, 2010; Maule, Chile, 2010; Tohoku, Japan, 2011; Samara, Costa Rica, 2012; Kaikōura, New Zealand, 2016; and Kahramanmaraş Türkiye, 2023), where severe **ground shaking** and **soil liquefaction** caused extensive damage to port facilities. In some cases, the resulting loss of port functionality persisted for years, with **cascading impacts** on trade and economic stability at both national and regional scales. Besides, since ports serve as **priority entry points** into affected areas, preservation of their functionality after an earthquake is vital for coordination of rescue and relief operations.

Prompted by the **poor performance of some port facilities** in recent earthquakes, research efforts worldwide have intensified over the past decades to develop improved methodologies, **technical guidelines**, and design criteria aimed at ensuring the seismic reliability, resilience, and sustainability of both existing and new port infrastructure. **Contemporary approaches** seek to integrate advanced geotechnical characterization, realistic ground-motion assessment, advanced soil–structure interaction analysis, and performance-based design principles, with the overarching goal of **enhancing resilience** and **sustainability** while reducing the likelihood of system-level failures.

The existing **international guidelines** for the seismic design of port structures, published in 2001 by the **World Association for Waterborne Transport Infrastructure** (PIANC), largely reflect lessons learned more than 30 years ago from the observed seismic response of port facilities worldwide. At the time of publication, the 2001 PIANC document represented **state-of-the-art** best practice and effectively introduced performance-based design to the **ports and maritime industry**. Since then, however, numerous new codes, standards, and technical documents have been issued over the past two decades, rendering significant parts of the 2001 guidelines no longer fully aligned with current practice including modern marine construction techniques. Thus, in 2020, PIANC established **Working Group 225** (WG225) to update this seminal document so that it reflects **contemporary international practice** and provides robust, forward-looking guidance for continued use in the coming decades.

This course originates from the activities of WG225 with the aim of presenting the **newly developed PIANC seismic design guidelines** for port structures to an international audience at the time of their publication. The report, expected to be published in late **2026**, is intended to support a broad range of marine infrastructure stakeholders-facility owners and operators, designers and practitioners, regulators, and scientists/academics-in jurisdictions both with and without their own **design standards for marine structures**.

The course is organized and coordinated by Prof. C.G. Lai and Dr. C.E. Ospina, both of whom are key contributors to PIANC WG225.

The **objective of this course** is to provide participants with a rigorous and integrated understanding of the **seismic behaviour of port structures**, the underlying mechanisms governing their vulnerability, and state-of-the-art methodologies for their analysis, design, and retrofitting. **The course will cover**:

- **Fundamentals of performance-based seismic design** for port facilities including typologies, design objectives, excluded structures and actions. Concepts of seismic capacity protection.
- **Characterization of earthquake ground motion**, site-geotechnical conditions. Earthquake-induced soil liquefaction with emphasis on their effects on waterfront and port structures.
- **Damage criteria and performance measures** for earth structures, quay walls, piers, wharves and other berth structures; ancillary components. Structural stability and functionality. Displacement-based concepts including strain and rotation limits in piles.
- **Seismic analysis methodologies for port infrastructures** including selection and application of appropriate types of analysis for retaining systems, slopes, pile-supported systems and critical ancillary elements with explicit consideration of uncertainties.
- **Best-practice strategies for seismic design and detailing** including design of pile-to-deck connections and joints, seismic retrofitting and upgrading of port infrastructure. Soil-improvement methods, structural systems and practical design recommendations including treatment of batter piles. Modern accelerated marine construction methods involving use of precast concrete elements.
- **System-level seismic risk of port infrastructures**, including the use of GIS/WebGIS tools to map and evaluate risk, with specific attention to interdependencies among port components and potential domino (cascade) effects.
- **Vulnerability of ports to tsunami hazard**, including tsunami generation, intensity and magnitude scales, catalogues, methods for site-specific risk evaluation, and the impact on port structures and infrastructures.

The course addresses the above-mentioned topics within a **unified framework**, without artificial distinctions between structural and geotechnical engineering. It is **trans-disciplinary** in scope and delivered by internationally recognized specialists in their respective fields.

TARGET AUDIENCE

The course is intended for civil and structural engineers, geotechnical practitioners, designers of marine infrastructures, port authority and regulatory agency staff, as well as researchers and graduate students involved in the planning, design, assessment, and upgrading of seismically resilient port facilities.

COURSE MATERIAL

Each registered participant will receive a complimentary copy of the newly released PIANC Guidelines for the Seismic Design of Port Structures, authored by members of Working Group 225–several of whom are also lecturers in this course.

LECTURERS

- **C.E. Ospina - Moffatt & Nichol, Houston, USA**
  10 lectures on: *Introduction to performance-based seismic design. Seismic analysis of port structures. Types of structural analyses and selection. Best practices in seismic design and detailing including pile-to-deck connections. Treatment of accelerated marine construction. Different approaches for design and detailing in current seismic codes.*
- **M. Percher - GHD, Castro Valley (California), USA**
  7 lectures on: *Force-based versus displacement-based seismic design. Analysis of pile-supported structures. Analysis of ancillary components and structures. Analysis of retaining structures and slopes.*
- **C. Habets - Haskoning, Delft, The Netherlands**
  5 lectures on: *Soil investigation and definition of site geotechnical model. Role of the uncertainty in seismic analysis of port structures.*
- **C.G. Lai - University of Pavia, Italy**
  5 lectures on: *Earthquakes and port structures - Seismic damage to port structures. Site conditions and definition of earthquake ground motion. Earthquake-induced soil liquefaction and lateral spreading.*
- **C. Cecioni - University of Roma Tre, Italy**
  4 lectures on: *Vulnerability of ports to tsunami - Overview on seaquakes and their generation. Evaluation of tsunami risk at specific maritime ports. Impact of tsunami on port structures*.
- **H. Frandsen - Haskoning, London, United Kingdom**
  4 lectures on: *Design philosophy - Performance-based methodology. Performance-based design approach. Performance objectives. Design event earthquake motions. Performance evaluation.*
- **F. Bozzoni - Eucentre Foundation, Pavia, Italy**
  2 lectures on: *Seismic risk of port infrastructures - Use of GIS and WebGIS technology to map the seismic risk of maritime port systems.*
- **R. Rodriguez-Plata - Haskoning, Rotterdam, The Netherlands**
  2 lectures on: *Advanced numerical modeling of port structures. Seismic response of pile-supported wharves in liquefiable ground.*

Course venue: Pavia, a picturesque university town 40 km south of Milan.