



UNIVERSITÀ DEGLI STUDI
DI PERUGIA



CIVIL AND ENVIRONMENTAL ENGINEERING DOCTORAL PROGRAM

RISK ANALYSIS, RESILIENCE AND LIFE CYCLE COST ASSESSMENT OF STRUCTURES AGAINST WIND HAZARDS

Instructor:

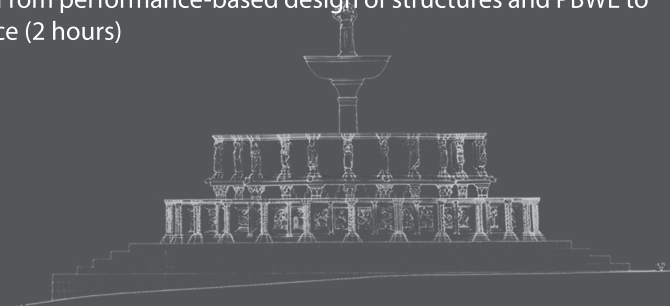
Luca Caracoglia, Ph.D., Associate Professor, Northeastern University, Boston, 02115 MA, USA

Course Description:

The course will first introduce theory and methods for random vibration analysis and probabilistic engineering mechanics. The course will present the latest developments in the field of performance-based engineering and resilience against wind hazards. The definition of the resilience includes two important concepts that can be applied to civil engineering structures: the examination and assessment of recovery time, for example related to cost of maintenance and repair needed by a structure, and the principles of performance-based design. This course will integrate these two concepts and their application in the field of civil engineering. Application examples will be primarily related to the field of wind hazard engineering, which is the primary research field of the instructor. Course modules will focus on modeling of wind fields, turbulence and aerodynamic loads for structural engineering. Dynamic analysis methods will be applied to the structural response under random wind loads. Various applications of probability principles in relation to design of long-span bridges and tall buildings will be considered. The course will provide both fundamentals and application examples associated with the field of performance-based wind engineering. A practical tutorial is also planned.

Course Schedule (18 hours, 3 CFU):

- May 10:* Review of probability and statistics for civil engineering students (2 hours)
- May 11:* Review of random vibrations and structural wind engineering (2 hours)
- May 12:* Introduction to performance-based design in structural engineering (2 hours)
- May 13:* Wind-induced vibrations on low-damping, tall building structures: Lifecycle Cost Assessment (LCCA) and PBWE (2 hours)
- May 14:* Practical tutorial: Design of a PBWE – compliant structure using LCCA analysis (2 hours)
- May 24:* Fluid-structure interaction phenomena for flexible systems: aeroelasticity (2 hours)
- May 25:* Wind-induced vibrations on long – span bridges: wind load uncertainty propagation for Performance-Based Wind Engineering (PBWE) (2 hours)
- May 26:* Introduction to numerical methods for risk analysis, e.g. event tree, fault tree (2 hours)
- May 27:* From performance-based design of structures and PBWE to Resilience (2 hours)



Luca Caracoglia is an Associate Professor at the Department of Civil and Environmental Engineering of Northeastern University, Boston, Massachusetts, USA. He joined Northeastern University in 2005. Prior to this appointment, he was a post-doctoral fellow in the Department of Civil Engineering at Johns Hopkins University, Baltimore, Maryland (USA) in 2001-2002 and a post-doctoral research associate in the Department of Civil and Environmental Engineering at the University of Illinois (Urbana-Champaign, USA) in 2002-2004. He received his Ph.D. in Structural Engineering from the University of Trieste, Italy in 2001. His interests are in structural dynamics, random vibration, wind engineering, fluid-structure interaction of civil engineering structures, linear and nonlinear cable network dynamics, wind-based energy harvesting systems and wind energy. Luca Caracoglia received the NSF-CAREER Award in 2009. He was elected Fellow of the American Society of Civil Engineers in 2020.

Location:

Teams platform - Campus of Engineering of University of Perugia
Latitude: 43.118177 Longitude: 12.357942

Timetable:

May 10 - 14, 2021, from 15:00 to 17:00 CET
May 24 - 27, 2021, from 15:00 to 17:00 CET

Registration information:

To get the link for the Team Platform please send an email to ilaria.venanzi@unipg.it
There is no registration fee for the Course.

