



## Lectures announcement

# Integrated Approaches for Assessing Risk in Historic Urban Areas: From Data Management to Decision-Making

**Prof. Tiago Miguel Ferreira**  
**University of the West of England (UWE Bristol)**



1755 Lisbon earthquake, tsunami, and fires

**5 hours - 1 cfu**

**Classes will be in English, Compulsory attendance  
(Pescara, Polo Micara, room M5)**

**Final essay** based on a set of questions provided on the first day. Final essay is compulsory to obtain 1 cfu

### ABSTRACT

Historic urban areas are, almost by definition, risk-prone areas. The buildings in historical sites are often highly vulnerable to natural and human-made hazards, not only due to their construction and material characteristics but also because they are usually degraded as a result of ineffective maintenance and conservation policies. Moreover, the recent global tourism boom has resulted in a significant increase in the population of residents, workers, and visitors in these areas. This, combined with the impacts of land use changes and climate change, renders historic centres particularly exposed to various hazards.

This set of lectures delves into the essential processes and techniques for assessing risk in historic urban areas, emphasising their practical applications to support decision-making.

The use of traditional and innovative data collection techniques will be the first topic to be addressed, highlighting the advantages and challenges associated with each approach. The adoption of cloud-based solutions will also be explored. Afterwards, the use of Geographic Information System (GIS) tools for aggregating, treating, and mapping building data will be discussed. The focus will lie on integrating risk assessment outcomes into GIS, facilitating robust analysis and visualisation of spatial information.



Subsequently, vulnerability and risk assessment approaches take centre stage, focusing specifically on earthquakes, floods, and fires. Participants will be introduced to simplified vulnerability assessment methodologies that generate physical vulnerability indicators for different hazards. The process of combining these indicators with hazard scenarios will be explored to obtain risk results at various scales, ranging from individual buildings to entire municipalities.

The practical application of these assessments becomes evident as participants are guided through the creation of damage scenarios, estimation of losses, and assessment of retrofitting techniques using cost-benefit analyses. Then, the focus will be given to how the identification of critical buildings can aid pre-disaster decision-making and how the identification of obstructed urban paths and the simulation of evacuation scenarios can support post-disaster actions.

Lastly, participants will delve into aspects related to uncertainty analyses and calibration procedures. Participants will gain insights into effectively addressing and handling uncertainty in large-scale assessments. The utilisation of statistical and machine learning-based approaches, including the application of Artificial Neural Networks for calibration purposes, will also be explored.

## OBJECTIVES

The lectures are oriented to:

- Equip participants with the knowledge of techniques and tools for effective data collection, management, and presentation, including traditional and innovative methods as well as cloud-based solutions.
- Provide participants with an understanding of how Geographic Information System (GIS) tools can be utilised to aggregate, treat, and map building data, along with risk assessment outcomes.
- Familiarize participants with vulnerability and risk assessment approaches applicable to earthquakes, floods, and fires, enabling them to derive physical vulnerability indicators and assess risks at different scales.
- Enable participants to utilise damage scenarios for pre- and post-disaster decision-making, including the creation of scenarios, estimation of losses, identification of critical buildings, and evaluation of retrofitting techniques through cost-benefit analyses.
- Familiarize participants with basic concepts of uncertainty and calibration and how they should be considered to ensure robust vulnerability and risk assessment analyses.

✉ **Register by May 29, 2023** sending email to:

[g.masciotta@unich.it](mailto:g.masciotta@unich.it) & [Tiago.Ferreira@uwe.ac.uk](mailto:Tiago.Ferreira@uwe.ac.uk) (in cc)

*For those not at University of Chieti-Pescara it is possible to follow the short course online: specify request when you register.*

TIMETABLE			
<b>TUESDAY</b>	30/05/2023	11:00	13:00
<b>WEDNESDAY</b>	31/05/2023	14:00	17:00