

“Reliability and Risk Analysis”

6-19 February 2015

University of Minho, Guimarães, Portugal

A Consortium of Portuguese Universities launched recently a PhD program on “Analysis and Mitigation of Risks in Infrastructures” (<http://infrarisk.tecnico.ulisboa.pt/>).

The course “Reliability and Risk Analysis” will be taught during February 6-19, 2015, at University of Minho, Guimarães, Portugal, by experts in the field of risk analysis, covering topics such as reliability and design codes, or hazard and system analysis. A set of practical examples will be given to students. The language of instruction and course materials is English.

This course will be an important opportunity for those developing work in the field of risk analysis or needing to apply reliability concepts.

Lecturers involved

Laura Caldeira: Head of the Geotechnical Department and Principal Research Officer at the National Laboratory for Civil Engineering and Invited Full Professor at University of Lisbon, where she has been developing research in the field of geotechnical engineering. Her main research interests are related to dam engineering, risk management and seismic engineering. Dr. Caldeira has been involved in several research projects in the field of risk management.

Michael Faber: Professor at the Technical University of Denmark. His main research activities have been centred around structural reliability analysis, Bayesian decision analysis, reliability based structural design and assessment, probabilistic modelling of fatigue crack growth, probabilistic modelling of corrosion of concrete structures, risk based inspection and maintenance planning, modelling of preferences and consequences in decision making, generic approaches in risk assessment, large scale risk assessment and issues relating to sustainability.

José Matos: Assistant Professor at the Civil Engineering Department of Minho University. He has a PhD in the field of probabilistic-based assessment of existent structures. His research fields cover asset management, life-cycle costs, safety assessment and risk analysis. Dr. Matos is currently the coordinator of the SustIMS project with the largest Portuguese highway operator.

Daniel Oliveira: Associate Professor at the Department of Civil Engineering, University of Minho, where he has been developing research in the field of masonry constructions. His main research interests are related to earthquake engineering, risk management and composite materials. Dr. Oliveira has been involved in several research projects in the field of seismic analysis of masonry constructions and is currently the coordinator of an existing course on “risk assessment and management” at University of Minho.

Xavier Romão: Assistant Professor at the Faculty of Engineering of the University of Porto. He is a national delegate of the International Scientific Committee on Risk Preparedness of ICOMOS. His main research interests address fields such as seismic safety assessment, seismic risk and economic loss assessment, probabilistic and simplified risk analysis for cultural heritage. Dr. Romão is an Expert Member of the Working Group “Disaster Loss Data in the EU”, currently developing a European standard for the collection of disaster damage and loss data.

Advanced Course in “Reliability and Risk Analysis”

Syllabus

Introduction to risk

- General concepts and terminology
- Risk management approach

Reliability according to design codes

- Design principles and criteria using a probabilistic basis
- Performance limit states
- The semi-probabilistic and full probabilistic approaches
- Simulation techniques and safety index

Hazard identification

- Checklists
- Preliminary hazard analysis (PHA)
- Hazard and operability analysis (HAZOP)

System analysis

- Failure mode and effect analysis (FMEA)
- Systematic identification of release points (SIRP)
- Fault tree analysis (FTA)
- Event tree analysis (ETA)

Risk analysis

- Consequences analysis: loss of life and quantification of economic losses.
- Risk assessment and robustness
- Methods for the risk control. Cost-benefit analysis and cost-efficiency of control measures.
- Tolerable and acceptable risk criteria. Risk perception, risk aversion and risk mitigation.

Examples of risk analysis applied to civil engineering