

## “Reliability and Risk Analysis”

19<sup>th</sup> February 2018 – 2<sup>nd</sup> March 2018

Instituto Superior Técnico, Lisboa, Portugal

### Syllabus

#### Reliability according to design codes, by António A. Correia (19/2 and 20/2)

- Introduction to design codes
- Standardization of design principles
- Design criteria stated on a probabilistic basis
- Performance limit states
- The semi-probabilistic approach
- Definition of characteristic value, design value and partial safety factor
- Calibration of safety factors using reliability analysis methods
- The full probabilistic approach
- Simulation techniques and safety index

#### Hazard identification, by Ângelo P. Teixeira (21/2)

- Introduction to Risk Analysis and Management
- Preliminary hazard analysis (PHA)
- Hazard and operability analysis (HAZOP)
- Failure mode and effect analysis (FMEA)

#### System modelling and reliability, by Ângelo P. Teixeira (22/2)

- Fault tree analysis (FTA)
- Event tree analysis (ETA)
- Reliability block diagrams
- System reliability

#### Decision analysis, by Ângelo P. Teixeira (23/2)

- Decision optimization: prior, posterior, pre-posterior
- Bayesian probabilistic networks
- Influence diagrams

#### Risk analysis, by António A. Correia (26/2)

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

#### Tutorial Class, by António A. Correia (27/2)

#### Examples of risk analysis applied to civil engineering, by Laura Caldeira (28/2)

- Geotechnical engineering/Earth dams

#### Examples of risk analysis applied to civil engineering, by Romeu Vicente (1/3 and 2/3)

- Structural/Earthquake engineering
  - Large scale vulnerability assessment methods and criteria
  - The use of GIS platform and programming for urban management
  - Physical damage and loss assessment scenarios – case studies
  - Mechanical model methods and criteria – case studies