Course Name:
Infrastructure Risk and Resilience

Course Number:
20008

Credit:
3

Course Content (outline):

- **Introduction**
  - Hazard
  - Infrastructure
  - Consequence
  - Man-made disasters
  - Natural disasters
  - Motivation: Case Study of 1396 Kermanshah Earthquake

- **Resilience-based engineering**
  - Definition of resilience
  - Design philosophies
    - Allowable stress design
    - Load and resistance factor design
    - Performance-based design
    - Resilience-based design
  - Quantification of resilience
  - Properties of resilience
    - Robustness
    - Resourcefulness
    - Rapidity
    - Redundancy
  - Sustainability versus resilience

- **Robustness quantification via risk analysis**
  - Fragility model
- Discounting model
- PEER’s performance-based earthquake engineering framework
- ATC-13 framework
- FEMA-NIBS framework
- Reliability-based framework
  - Multi-model reliability analysis
  - Multi-hazard risk analysis

- **Resourcefulness via Bayesian networks**
- **Recovery analysis via simulation**
  - Agent-based modeling
  - Recovery modeling in *Rtx*

**References:**

- Various articles in top probabilistic journals.