



**Venice International University**  
**VIU Summer School**  
**Critical Infrastructure Resilience**  
**July 16 – 20, 2018**

**Schedule:**

Morning: 9:30 – 12:30

Afternoon: 14:00 – 18:00

Venue: Room 9A (1st floor)

**Day 1 – Monday July 16**

9:15 Welcome coffee and Registration

**Morning:** Erdem Ergin, Università degli Studi di Roma "Tor Vergata"

**Module 1 – Definition and role of critical infrastructure**

The first session will provide background information on critical infrastructure and resilience, with a look on the concepts behind them. The session will therefore include a discussion on the structural changes affecting our society as a whole and the drivers of risk. The session will then look at the challenges of building critical infrastructure resilience alongside examples from recent events.

**Afternoon:** Gaetano Vivo, European Commission

**Module 2 – The EU framework**

This session will present the European Union's current policy framework for critical infrastructure protection and disaster resilience. It will also review the instruments available at EU level to deal with cross-border disasters stemming from or affecting critical infrastructure. There will be a focus on how new, complex risk scenarios are shaping EU policy-making and on the operational challenges of promoting joint planning between the critical infrastructure and disaster management communities.

**Day 2 – Tuesday July 17**

**Morning:** Jonas Johansson, Lund University

**Module 3 – Cascading impacts and ranking criticality**

The third session will explore ways to understand the complexities involved with our society's interconnected infrastructures and challenges related to addressing critical infrastructure resilience. It will share concrete case studies from events such as the European power blackout in 2006, the Eyjafjallajökull Volcanic Eruption in 2010, and the Hurricane Sandy in 2012 and the assessment of infrastructure resilience through empirical failure data. Based on these case studies insights into the effect of interdependencies and cascading impacts are given, e.g. key characteristics to consider and geographical scale and temporal aspects of different types of



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critical infrastructures. It will further explore on various parameters to rank the importance of assets and infrastructures.

**Afternoon:** Marcus Abrahamsson, Lund University

#### **Module 4 – Risk assessment & developing scenarios**

In the fourth session an overarching framework for risk management, the basics of how to conduct risk assessments, and ways of presenting risk will be given. This will include addressing main components of risk, how to develop and structure scenarios, how to assess likelihoods and consequences and how to present and evaluate risk. The session will give a general introduction to risk assessment with special emphasis on how to apply risk assessment principles & tools on critical infrastructure systems.

#### **Day 3 – Wednesday July 18**

**Morning:** Erdem Ergin, Università degli Studi di Roma “Tor Vergata”

#### **Module 5 – CI Resilience solutions from infrastructure, business and agriculture**

This module will discuss the application of critical infrastructure thinking to 3 different sectors by sharing and discussing findings of 3 ongoing studies: (1) critical infrastructure risk assessment for logistics and energy at regional level, to improve investment planning, (2) lifeline utility business continuity planning in an Organized Industrial Zone, and (3) key agricultural product risk assessment. They illustrate the application of CI resilience, together with the design process, the stakeholder mapping and the findings.

**Afternoon:** Charles Baubion, OECD

#### **Module 6 – Key policy challenges to critical infrastructure resilience**

This session will present the OECD High Level Risk Forum approach to critical infrastructure resilience. It will focus in particular on governance issues related to information-sharing between government and CI operators – public and private – and on policy tools that governments can use to foster CI resilience investments. With examples of OECD country practices and interactive discussions, the session will aim to offer a perspective on what governments can do to re-adjust their CI policies in an evolving risk landscape.

**Evening:** Social dinner @VIU

#### **Day 4 – Thursday July 19**

**Morning:** Mitsuyoshi Akiyama, Waseda University

#### **Module 7 – Life-cycle-based design and assessment of civil systems under multiple hazards**

This module presents a general framework for estimating the life-cycle risk, resilience and sustainability of structures and infrastructures under multiple hazards. Although earthquake is still a dominant hazard to structures in many earthquake-prone countries, a design and analysis of life-cycle performance and cost have to consider both independent and interrelated hazards causing structural failure. Such an approach is presented in this session. In addition, issues related to life-cycle analysis, design, and assessment of structures under earthquake and other hazards are discussed. Finally, the concepts and methods presented are illustrated on both individual structure and transportation networks.

**Afternoon:** Available Faculty

#### **Module 8 – Applied Session**



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## **Day 5 – Friday July 20**

**Morning:** Carlo Giupponi, Università Ca' Foscari Venezia

### **Module 9 – Decision-making under uncertainty**

In the ninth session the resilience concept will be applied in the context of how climate change can affect the performance of critical infrastructures and in particular to the case of flood risk in the design of airport infrastructures. A conceptual framework will be proposed and operational solutions will be presented with a case study. Both quantitative and qualitative information are considered for the design of robust plans, i.e. plans that could be resilient to expected climate change impacts. Acquired information are managed in a multi-criteria analysis decision support system, making use of data mining techniques to identify preferable solution within a set of alternative ones.

**Afternoon:** Federico Carturan, RiskApp

### **Module 10 – RiskApp, presentation and logic of a cascading impact estimation software**

The class will cover the methodologies currently used to perform a critical infrastructures risk assessment, in particular the literature sources suitable to get downtimes due to natural events will be reviewed, a methodology to collect the expert judgement used to adapt the data points form literature to specific infrastructures will be analyzed. Moreover, obtaining the correct hazard scenario is another key activity for a proper CI risk assessment, a survey of the best references for earthquakes, flooding, high temperature, sea level rise etc. will be presented. The general framework of a computational risk assessment will be presented and, subsequently, an interactive exercise of risk assessment will be conducted on a selected CI element using the aforementioned methodology.