



Venice International University
VIU Summer School
Critical Infrastructure Resilience
September 7 – 25, 2020

Schedule

Each module will be delivered from **12:00 to 3:00 pm** on **Mondays, Wednesdays and Fridays**, from September 7 to September 25.

Only on **Friday, September 18**: two modules (M6 - M7) will be delivered from **10:00 am to 5:00 pm**; the day is organized in cooperation and with the scientific support of **Enel Foundation** and its **Open Africa Power Program**.

All times given are in Central European Summer Time (UTC+2).

- M1 – Definition & role of critical infrastructure
- M2 – Cascading impacts & ranking criticality
- M3 – RiskApp, cascading impact estimation
- M4 – Cascading impact evaluation examples
- M5 – Applied work
- M6 – Resilience tactical toolkit
- M7 – Sustainability in operations: the case for resiliency to enter the board room
- M8 – Decision-making under uncertainty
- M9 – CI Resilience solutions from infrastructure, business and agriculture
- M10 – Applied work & Course Wrap-Up

Module 1 – Definition and role of critical infrastructure

Erdem Ergin, Università degli Studi di Roma "Tor Vergata"

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 resilience and how critical infrastructure is a strategic entry point.

Module 2 – Cascading impacts and ranking criticality

Jonas Johansson, Lund University

The second 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

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

Module 3&4 – RiskApp, presentation and logic of a cascading impact estimation software

Federico Carturan, RiskApp

These two sessions 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 from 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.

Module 5 – Applied Work

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

This session is an opportunity for participants to share their work and experience on critical infrastructure resilience. Participants will apply class material on selected work and experience. This will both put the class material to use and provide feedback to participants who want to share their work. Past editions have shown how the cumulative experience of participants is an asset and how we can use it to learn from each other.

Module 6 – Resilience tactical toolkit

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

Crises are powerful agents of change. They can wipe out years of efforts, but they can also serve to accelerate positive change if dealt with properly. Past disaster experience indicate that decision-making is the single most important factor for building resilience through crises. This session will present a resilience tactical toolkit based on a timeline guiding decisions in crisis, recovery and normal phases. It has been already deployed and tested and is being further refined for different users such as business associations, professional chambers, universities, and municipalities.

Module 7 – Sustainability in operations: the case for resiliency to enter the board room

Carlo Papa, Enel Foundation

Giovanni Valtorta, e-distribuzione

After a snapshot of increasing hazardous phenomena and a brief analysis of the Sendai Framework for disaster risk reduction, students will focus their attention on 1-2 business cases related to Investment for resilience and effective response (specific target: infrastructures and networks).

Module 8 – Decision-making under uncertainty

Carlo Giupponi, Università Ca' Foscari Venezia

In this 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.



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Module 9 – CI Resilience solutions from infrastructure, business and agriculture

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

This session 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.

Module 10 – Applied Work & Wrap up

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

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