

*You are planning/designing something that supports an important operation. It may be a data centre, supermarket, hospital, community or correctional facility. Whatever the facility, the function that it houses cannot fail because the consequences would be too great. Therefore, the way we design the facility must enable the continuity and rapid recovery of those essential functions in a catastrophe. Identifying this requirement is the essence of infrastructure resilience planning, and a pressing concern of property asset managers around the globe. This course is taught from first principles and requires no prior specialist knowledge. The skills that you will learn are both scalable from a school building to a national utility network and can be applied to new and existing infrastructure. We can similarly apply them to post-disaster response, reconstruction and overseas development.*

Course Designation: **APS1024 Infrastructure Resilience Planning**, starting Saturday, 15 Oct 16. The course will be full days, from 09:00 to 17:00 with 30mins for lunch. It will run over four Saturdays, with a gap for the UofT Campus Weekend 22 Oct 16. A foundation course of the CRCI; <http://www.crci.utoronto.ca/education/academic/infrastructure-courses>.

Calendar:

- |           |   |
|-----------|---|
| 15 Oct 16 | <p>Course introduction and administration.</p> <p>We explore the purpose of infrastructure and the context in which it is used; how this context changes both operationally and in terms of wider hazard risk. We investigate the nature of resilience, how it differs from protection, and what it means for communities and business. We discuss the drivers of resilience, how it relates to sustainable economic development, and the concepts of ‘equilibrium’ and ‘carrying capacity’. We then focus on the primary tools, working from first principles, starting with location risk analysis, calculation plans, and mission analysis, before moving to more complex tools such as Intelligence Preparation of the Operating Environment, Demand &amp; Dependency Management, and Resilience-Protection Investment Balance. We will look at how some of these tools are brought together to deliver specific frameworks for community or utility infrastructure resilience. We then deep dive into the theory and practice of Operational Resilience, All-Hazards and Recovery planning parameters. Issue Assignment.</p> |
| 29 Oct 16 | <p>Review of Assignment.</p> <p>We explore the concept of Security Integration at the Strategic, Operational and Technical levels, the application of All-Hazards and the <math>\Phi_\alpha</math> &amp; <math>\Phi_\beta</math> trade-off and investment balance with resilience and recovery. We will look at security systems in capability terms and how technological change effects their value and efficacy specific to an operation.</p> <p>Site Survey – assessing the operational resilience for a major international event – walk through / talk through with</p>   |

syndicate and open forum discussions of concept solutions.  
Issue Project 1.

- 5 Nov 16      Review Project 1 – Initial Desk Top Study.  
We will continue looking into the capability requirements of various security and recovery systems, before exploring the concept, technology and practice of control systems. We now put all of the components together to build an operational resilience concept and plan, through a combination of lecture, syndicate work and open forum discussion.  
Issue Project 2.
- 12 Nov 16      Review Project 2 – Concept Development Report.  
We review the process of producing a Resilience Plan and what it means for operational and site assurance, how this affects value and even debt/equity ratios for capital investment.  
Examination

The Infrastructure Resilience Planning Course is assessed:

One assignment, representing 20% of the total course marks. Extract the necessary information and critically discuss. Keep asking ‘what does this mean in reality?’ to get to an impression of what is genuinely required and the effects that the stated policy and guidance have. Half of marks are for the correct description of the respective policies and associated structures, one tenth for extracting the issues that it raises and the remainder for your critical analysis of what it means.

**Discuss how current Canadian federal and provincial policies influence the delivery of effective national infrastructure resilience, compare and contrast with the equivalent in UK and US.**

If you are corresponding, use your country of residence as the subject and compare with the other two.

Two projects, each representing 20% of the total course marks. These are both research projects that require a first principles approach and critical assessment of the available information.

**1. Desk-Top Study.** If incomplete, half points will be given for a clear explanation of how each of the missing factors will be answered. A practised researcher will deliver the basic DTS in less than a day. It is highly likely to take you more than this. Do not fall into the trap of trying to research everything – stick to the operation in context.

**2. Concept Development Report.** Working as syndicates, you will build upon your DTS to devise a concept for how the client can enhance her confidence of operational survival.

A two-hour written examination comprising 3 essays selected from 10 possible titles. The final exam represents 40% of the total course marks.

Each of the assignments, projects and the final exam will be marked out of a possible 100 marks. The marks for each will be weighted according to the overall percentage of the course marks represented by that work and the whole aggregated for the final course mark / grade.

Throughout, credit will be given for demonstrating a clear understanding of the concepts, principles and application over specific processes or formulae.

You are strongly advised to become familiar with the reading and reference . Read “After the Flood: Exploring Operational Resilience” by Hay, and “The Edge of Disaster” by Flynn. You will also find Lewis and MacAulay very useful references throughout. New and second-hand copies of the books are available from the University Bookstore on the corner of St George St and College St. After the Flood is also available from Ben McNally books on Bay Street.

Address course questions and (correspondence) course work submissions to me at [alec.hay@utoronto.ca](mailto:alec.hay@utoronto.ca)