You are planning/designing something that supports a very 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. 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 and reconstruction and overseas development.

Course Designation: **APS1024 Infrastructure Resilience Planning**, starting Saturday, 18 Oct 14. The course will be full days, from 09:00 to 17:00 with 30mins for lunch. A foundation course of the CRCI; http://www.crci.utoronto.ca/education/academic/infrastructure-courses.

Calendar:

18 Oct 14 Course introduction and administration.
101 '**Operational Resilience'**. An introduction to the concept of operational resilience, how it is enables and an exploration of the operational components and context.
102 '**Infrastructure Systems Interdependencies'**. An exploration of different network types and how they relate to infrastructure systems, emergence theory and nodal vice dependency mapping leading to a detailed discussion about the 6-dimensional nature of infrastructure and how different infrastructure networks and systems coexist and inter/intra depend.
103 '**Calculation Plan'**. An introduction to the calculation plan, building from the initial desk top research and the various open source research resources available. The initial calculation plan is constructed and used as a vehicle to describe goal setting / mission analysis and deductive reasoning, the extraction of information requirements and their resolution, as well as an in depth evaluation of assumptions and their analysis.
Issue assignment.

25 Oct 14 Hand in assignment and review.
104 '**Environmental Context'**. An exploration of the concept of territorial intelligence and its modern application to the physical, socio-political and techno-economic environment. The Operating Environment Assessment tool is discussed and its conceptual precursors Intelligence Preparation of the Battlefield and Intelligence Preparation of the Operating Environment.
106 **'All Hazards'**. A detailed exploration of the All-Hazards concept and its interpretation in Canada vice US or UK. The

fundamental concepts are discussed and the available resources explored. The process of estimating hazards and the use of threat spectra, threat wheels and travel time charts are discussed in detail.
107 '**Integrated Security'**. The process of developing mitigation strategies for selection by the client 'board' by means of the Concept Development Report. The development of a overarching integration concept is gradually built up through the lecture.
Issue Project 1.

1 Nov 14 Hand in Project 1 and review.
Site Survey. Resilience assessment of a site for a short duration event. Walk-through / talk-through followed by group survey and planning with briefing of plans in open forum.
109 '**Security Measures I'**. An introduction and overview of physical security and protection measures.
110 '**Security Measures II**'. An introduction and overview of surveillance and detection systems.
Issue Project 2.

8 Nov 14 Hand in Project 2 and review.
111 '**Security Measures III'**. An introduction and overview of security procedures and personnel / organisational measures.
112 '**Resilience Plan'**. An exploration of how all the component strands are drawn together to produce a resilience plan that reflects the operational resilience requirement and remains within the resilience principles and concepts.
Review of concepts and principles.
Examination
Final tutorial and course review.

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. 50% of marks are for the correct description of the respective policies and associated structures, 10% for extracting the issues that it raises and 40% 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. Preliminary Calculation Plan**. If incomplete, half points will be given for a clear explanation of how each of the missing factors will be answered. Don't forget to deduce the necessary design parameters with a clear explanation of why. This will include what the design wind speed will be as well as seismic accelerations to use or design flood levels. It also extends into which options can and can't be used in the design concept.
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> **2. Concept Development Report**. Building upon the first project, this is the preparation of the whole project briefing for Board approval that you will present to the class. Since the projects follow one on the other, you can still achieve maximum points in the second project by rectifying deficiencies in the first project. Whilst this will not change the marks for the first project it will mean that you are not disadvantaged for the second project.

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 . Familiarise yourselves with Handy and Cialdini. Read Flynn and study Hay, Macaulay, Lewis, Boin, Cole and Robinson – more than 60% of what you need to know is in these four books and two papers [marked in bold on the reading list]. New and second-hand copies of the books are available from the University Bookstore on the corner of St George St and College St. The course textbook, Hay, is available from the University Bookstore.

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