

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE AND ENGINEERING
ELITE Master's Program

APS1031H1F2023 Infrastructure Planning

Course Outline

Introduction

This course is a practical guide to building an Infrastructure Development Plan (IDP). We work from first principles to apply what you learn to any jurisdiction in the world. Our focus is the first part of the IDP, which involves translating the vision of future capability and economy into infrastructure development requirements and strategy.

Infrastructure enables economic and social development; it enables the health of the population. It defines the world we live in and creates the world that our children will inherit. It is the critical enabler of the UN Sustainable Development Goals (SDGs), which drive many of the planning considerations and financing-approval criteria. It is more than what we build and includes what we harness of the natural world and how we decide to use it. It is necessarily multidisciplinary and is the essence of what engineering was at its very inception. However, this also means that it cannot be neatly contained in any one discipline or specialization. In the most authentic meaning of the phrase, it is *engineering in society, for society*.

This is not a procedural course. You will be taught the foundational concepts and principles of infrastructure planning and set a real IDP project over the semester. You will be working with a real client in real-time. However, the lack of reliability in scheduling access to clients as the pandemic restrictions change means that we must be prepared to work remotely without a site visit. You may be asked to present your findings to the municipal council. These projects are selected to develop your understanding of infrastructure planning and how to adapt it to the socio-economic circumstances in which you produce each aspect of IDP Part 1 – the Development Strategy. We will explore capability-based planning, risk evaluation, futuring, the *vitae* system of systems, the role of infrastructure and the concept of through-life value, and the role of infrastructure in the SDGs. We will also look at financing and contracting options with a focus on risk allocation. You will decide the pace and balance of the course.

This course is beneficial for those considering a career in infrastructure development, policy, international development, and infrastructure project finance and planning.

Course Designation

APS1031 Infrastructure Planning starts 11 Sep 2023. The course lectures and discussions will run on Mondays from 14:00 to 17:00. The course is evenly split between lectures and tutorials. This subject lends itself best to in-person teaching, where we can all benefit from everyone's experiences and perspectives presented through open forum discussion. If we have a return to pandemic restrictions and the classes move on-line, the classes will remain synchronous. It is a foundation course of the CRCI; <http://www.crci.utoronto.ca/education/academic/infrastructure-courses>.

Contact:

Dr. Alec Hay will be available by appointment throughout the semester. Contact should be made by email. alec.hay@utorono.ca

Evaluation

There are two assignments, each representing 10% of the total course marks. These are about fundamental concepts of infrastructure that you will consider and propose how they are best applied in a rapidly changing risk context.

One project, representing 45% of the total course marks. This is a practical survey and research project that requires a first-principles approach and critical assessment of the available information. Marks will be awarded separately for the project report (60%), decision brief (20%) and presentation (20%).

There will be an individual multiple-choice examination, mid-term, of 30 questions in 40 minutes. This represents 15% of the total course marks. This examination will be closed book.

There is also an individual one-and-a-half (1½) hour open book written examination comprising two (2) essay-type questions that you can select from a possible five (5). The exam represents 20% of the total course marks.

Materials

There are two required texts for this course “Sustainable Infrastructure: Principles into Practice” by C Ainger & R Fenner, and “Planning Resilient Infrastructure Systems” by A Hay. (Planning Resilient Infrastructure Systems was written from these course notes). These books contain a lot of valuable information that you will likely wish to refer back to over your careers, if you have anything to do with infrastructure in the future. I recommend that you borrow/rent “Doing it Differently” by D Blockley and P Godfrey and “GRASP” by JJ McLaughlin, M Ocock, A Oldfield & B Trebes. These are all available at very competitive prices and buy-back options through the UofT Bookstore. There are other useful readings that will be referenced during the course on Quercus. You may also be interested in “Designing Healthy Cities” by J Aicher, “Rethinking Masterplanning: Creating Quality Places” by H Al-Waer & B Illsley, and “Financing Infrastructure Projects” by T Merna & FF Al-Thani.

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