

University of Toronto at Scarborough
Department of Physical and Environmental Science
RISK (Environmental)
(ESTD19HS)

Course Director

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Office Hours Wednesdays 11:00am to 12:00pm or by appointment.

Course Lecturer

Dr. Q. Chiotti (Quentin.Chiotti@Metrolinx.com)

Prerequisite: STAB22H3 (or equivalent) and at least 14.5 credits.

Breadth Requirement Natural Sciences

Course Description

Risk and/or vulnerability assessment methodologies have come to dominate the environmental field, as notably evident in the IPCC assessment process. The wide scale adoption of such procedures across business sectors, government institutions, and civil society, is having a profound impact upon how modern society perceives its relationship to the environment. The huge uncertainties associated with ecosystems and socio-economic processes, the variability of access to knowledge and expertise, and the need to systematically assess a range of options in light of locally oriented social, cultural and economic values, has spurred this development.

Generally speaking, this trend has been received positively within the field, but the increasing proliferation of risk and vulnerability assessment procedures/protocols is also increasing the confusion regarding what constitutes the field's essential theoretical and methodological elements. Recently the *Environmental Action Lab* at UTSC has identified over twenty core knowledge domains within this literature, each with a slightly different interpretation of risk, and risk assessment procedures, as inclusive of scientific standards and protocols. Against this heterogeneous, methodological background we offer this course so that our students are better able to interpret the results of such assessment procedures (e.g. IPCC assessment reports), as well as participate, and advance the development of, real-world risk assessments as environmental professionals.

This course is anchored in direct experience with the development, and implementation of risk and vulnerability assessment methods. Recently, we have organized and participated in four major assessment procedures over the previous two years including:

- 1) With our collaborators within the Canadian Forestry Service, the United States Department of Agriculture Forest Service, the Professional Foresters of New Brunswick, and the New Brunswick Climate Change Research Collaborative, we have developed in-class climate/forest vulnerability training modules for the Atlantic region of Canada that include hands-on impact modeling, but also two complementary forms of forest climate change vulnerability assessments.

- 2) With our partners within the Canadian Rivers Institute, INRS, the Department of Fisheries, and University of Quebec at Montreal, we have developed a protocol for assessing the vulnerability of Atlantic salmon populations under a changing climate, as based upon the most up to date climate and hydrological modeling.
- 3) With the World Wildlife Fund, we have developed an agent-oriented, environmental impact critique for watershed health. This framework was used to examine the Comparative Environmental Impact Assessment of the Mactaquac Dam in New Brunswick.
- 4) And finally, we have participated in one of the largest climate vulnerability assessments undertaken in Canada. The Metrolinx climate change resilience assessment is based upon Engineers Canada PIEVC vulnerability assessment tool, but has expanded beyond this framework to include system-wide considerations for transportation infrastructure.

At the core of all these methods are scientifically based modeling exercises as structured around a scenarios based, methodological framework. Drawing upon our experience, as well as an extensive review of the literature, we will introduce students to both the theoretical foundations of risk management, and its' actual application.

Course Objectives

This course is intended to be a practical introduction to the concept of 'risk' as utilized in environmental decision-making. Students will be introduced to risk analysis and assessment procedures as applied in business, government, and civil society. Students will receive a broad array of inter-related, transferable, problem solving, assessment, and analytical skills:

- Students will learn about the theoretical foundations of risk\vulnerability theory, analysis and management as based upon brief, accessible, and application-oriented introduction to probability theory.
- As risk analysis is an extension of decision analysis, key elements of decision theory, utility theory, etc. will also be imparted to the students. The relationship of Risk Management to Project Management will be reviewed.
- Students will become aware of the broad array of assessment procedures, their commonalities, and critical differences.
- A major focus of the course though, will be to introduce students to the broad class of environmental risk\vulnerability assessments and the procedures, through which knowledge is integrated across disciplines\sectors\fields\communities:

“Natural scientists have assessed the probabilities for outcomes identified by ethicists reflecting on tradition, politics, and policy dilemmas. Social scientists have devised ways to explain these prospects and help individuals decide what they want, given what they might be able to have. Mathematicians and philosophers have formulated questions about uncertainties that computer scientists and psychologists have helped to answer. Sociologists and political scientists have shown how selecting experts and defining ‘risk’ can highlight some issues and obscure others.” (Fischhoff and Kadvany 2011)

At the end of the course, students will be able to critically assess the results of major environmental risk analysis and assessment exercises. Equally important, they will gain hands-on experience with actual assessment processes that they can draw upon in their professional lives.

RESOURCES

There are numerous texts and study guides associated with risk analysis, risk assessments and risk management. While there is no required textbook for the course, you will also be responsible for key articles\reports associated with Risk literature; links will be provided for individual articles and reports by the instructors on Blackboard at the appropriate time.

General Introductions:

Fischhoff, B., & Kadvany, J. (2011). Risk: A Very Short Introduction. Oxford University Press.

Beck, U. (1992). Risk Society: Towards a New Modernity. SAGE.

B. Williams and R. Hummelbrunner, Systems Concepts in Action: A Practitioner's Toolkit. Stanford University Press, 2010.

From the Business:

H. R. Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling. John Wiley & Sons, 2013. Available at:
http://www.coursesmart.com/9781118022276?_hdv=6.8&_professorview=false&_instructor=7303109&_referringfirstname=Jim&_referringlastname=MacLellan&_isreferringinstructor=true

Mulcahy, R. (2010). Risk Management Tricks of the Trade for Project Managers and Pmi-rmp Exam Prep Guide (2 edition). Minnetonka, Minn: Rmc Pubns Inc.

PMI, (2009). Practice Standard for Project Risk Management. Newtown Square, Pa: Project Management Institute.

From Government:

UNEP. (2010). Risk Management Training Handbook. Paris, FR: United Nations Educational, Scientific and Cultural Organization. Retrieved from
<http://www.unesco.org/new/en/bureau-of-strategic-planning/themes/risk-management/>

World Bank, 2017, Risk and Opportunity: Managing Risk for Development | World Bank Group. (n.d.). Retrieved September 12, 2017, from <https://olc.worldbank.org/content/risk-and-opportunity-managing-risk-development-0>

Risk governance - OECD. (n.d.). Retrieved September 12, 2017, from
<http://www.oecd.org/governance/risk/>

Treasury, H. M. (2004). The Orange Book: Management of Risk-Principles and Concepts. London: HM Treasury.

Treasury Board of Canada Secretariat, (2011, June 23). Risk Management [guidance]. Retrieved September 12, 2017, from <https://www.canada.ca/en/treasury-board-secretariat/corporate/risk-management.html>

Class Attendance

Web Option will be provided, but videos of the lectures will only be hosted for two weeks. Because of the practical nature of the material covered in class, class participation is highly recommended. Where possible a voluntary lab will be provided to help students work through the first two assignments.

Students are required to do readings before class and come prepared with questions about the readings to discuss in class.

Grading Scheme

There will be three assignments and a final exam. The assignments will progressively build upon each other, starting with a familiar and structured operating environment (e.g. assessing infrastructure risks in flood prone landscapes), then progressing towards more complex environmental considerations (e.g. integrated climate assessments).

As this course is intended to provide both a theoretical basis for final year courses, as well as expose students to practical application, it will require assessing both writing and communication skills, as well as problem solving and analytical capabilities. The exam will cover the theoretical aspects of the course, while the assignments will demonstrate the student's ability to apply their analytical and problem solving skills. Simplified impact models will be used within the assignments as a foundation for broader participatory methods.

Assignment #1:	15% (due October 5 th)
Assignment #2	20% (due October 26 th)
Assignment #3:	35% (due prior to last official class)
Final Examination:	30% (Scheduled in regular fall exam period)

Missed Term Work

Late assignments will be subject to a late penalty of 5% (of the total marks for the assignment) for the first day late (including weekends), and 10% every day after that. All assignments are due before the beginning of class. Assignments must be uploaded (see below).

Handing in Your Assignment:

PDF (Portable Document Format) hardcopy files of the assignments must be uploaded to Blackboard on the day that it is due. If you do not know how to create a pdf please search online for a tutorial (<https://support.office.com/en-us/article/Save-or-convert-to-PDF-d85416c5-7d77-4fd6-a216-6f4bf7c7c110>). I do not accept assignments sent by email.

Please follow University of Toronto procedures to be completed in order to be considered for academic accommodation for any course work such as missed tests or late assignments. Verification of Student Illness or Injury forms can be found on the Office of the Registrar's webpage (<http://www.illnessverification.utoronto.ca/getattachment/index/Verification-of-Illness-or-Injury-form-Jan-22-2013.pdf.aspx>).

Extension of Time

Students MUST submit a request for extension in ADVANCE of the deadline in order to receive a decision. For extensions of time beyond the examination period you must submit a petition through the Office of the Registrar. <http://www.erin.utoronto.ca/index.php?id=6988>

Verification of Student Illness or Injury forms can be found on the Office of the Registrar's webpage (<http://www.illnessverification.utoronto.ca/getattachment/index/Verification-of-Illnessor-Injury-form-Jan-22-2013.pdf.aspx>).

A Note on Marking

Feel free to contact me at any time to discuss the requirements of this course. If you are unhappy with the mark you received on an assignment\exam\project please come to speak to me with a written response to the comments provided for your assignment\exam\project.

Academic Integrity

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil/utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment. On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes. Please avoid academic dishonesty, have confidence in your own ability to learn and grow academically by doing your own thinking and writing!

Accessibility

Students with diverse learning styles and needs are welcome in this course! In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in SW302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca

Communicating With You

This is a very 'hands-on' course; by far the best way to communicate with me is during class and during office hours. If you send me an email, please follow it up during class. The subject line of your email must contain the course number and course title or I will be unable to differentiate your email from the numerous other emails I receive.

From time-to-time I will send email messages or post messages on Blackboard to notify you of changes in schedule and opportunities that you may want to take advantage of. I can only send messages to your U of T e-mail address. If you use another account (gmail, hotmail, yahoo, etc.) make sure that your U of T email is sent to your alternate email account. I am usually on campus during the term – please drop by my office if you have any questions or concerns.