Physical & Environmental Sciences
UNIVERSITY OF TORONTO
SCARBOROUGH

2017 WINTER

UNDERGRADUATE COURSE OUTLINE

EES D20: Environmental challenges in urban environments

Instructor: Nick Eyles (eyles@utsc.utoronto.ca)

Teaching Assistant: Kirsten Kennedy

Classroom: MW160 7-10 pm Wednesdays commencing January 4th

Scope

This course will interest students from a broad range of disciplines ranging from specialist environmental scientists to those interested in urban planning and design, city studies or urban ecology.

What you learn in this course can be applied to any urban area and it will be interest to students wishing to seek professional accreditation under the Association of Professional Geoscientists of Ontario (APGO).

Our world is increasingly urban and by 2050 it is estimated that 5 billion people worldwide will live in an urban area. The growth of large poorly-planned and rapidly growing 'supercities' (defined by populations greater than 2 million) is proceeding at a rapid pace. In 1950 there were 43 such cities, today more than 200 with 19 of them having more than 20 million inhabitants.

Currently, a sixth of the world's population (>1 billion people) live in urban slums and by 2030 fully one third of the world's population will live in an active tectonic area: recurring earthquakes, landslides, wastes, droughts, food and security are major environmental issues.

Increased urban populations result in a markedly reduced 'resilience' in the face of environmental challenges.

The global rush to the city is also paralleled here in Canada. Today, 80% of Canadians live in an urban area, a complete reversal of the situation 100 years prior. The effects are far reaching creating what is called an 'urban shadow'. This refers to regional and global environmental impacts (i.e., well outside the city itself) that arise from the need to import energy, food, construction materials and other resources matched by the complementary export of waste materials (municipal, industrial and radioactive waste etc). The risk from natural hazards (e.g., earthquakes, severe weather) increases as urban areas become larger and denser; the regional climate is also altered and there are massive negative impacts on watersheds, air and water quality, hydrological cycles and groundwater systems. Most cities have to deal with the legacy of 'historic wastes' disposed of in the past under more lax environmental regulations. Large areas of cities are underlain by 'fill' (often contaminated waste materials) which requires the use of geophysical techniques to map, and a variety of geochemical tools to remediate. The high cost is a major impediment to reuse of 'brownfield' sites.

This course will provide you with an overview of the impact of urban development on watersheds and waterfronts principally across the Greater Toronto Area but we will also touch on global issues. You will become familiar with the geology and environmental

settings of the principal urban areas Canada and Ontario. We will emphasize the geology of ice-age glacial deposits and the principal geophysical and other techniques employed by to explore the shallow (<50 m depth) subsurface. Many contaminants move through the subsurface in water and attached to sediments so it is fundamental to have a detailed knowledge of likely transport routes both in the surface and subsurface. This requires detailed knowledge of local geological conditions, which in Canada tend to be dominated by 1) fractured rock 2) glacial sediments, and 3) man-made ground (fill) underlying the so-called 'built landscape'.

A weekend field trip in late March will familiarize you with many of these issues by visiting contaminated sites in Ontario and New York State (e.g., Love Canal).

Preliminary timetable and topics

Week 1: 4th January Introduction, scope of course, grading practice, learning outcomes and expectations.

Weeks 2 and 3: 11/18th January 'Geological and environmental setting of Canadian cities: a four layer model typically 1: Precambrian 'basement' rocks, 2: Paleozoic and Mesozoic 'cover' rocks, 3: glacial sediments and 4: fill (also called 'man-made ground') of the 'built landscape.'

Week 4: 25th January: Landfilling and the legacy of historic wastes in urban watersheds

Week 5: 1st February: Engineering geology of urban areas; problematic rocks and sediments

Week 6: 8th February Invited lecture: Dr. Kathy Wallace (UTSC): Assessment and remediation of contaminated lands: case studies and methods (Collingwood Harbour, Port Hope, Port Industrial District)

Week 7: 15th February: Impact of urbanization of surface waters and watersheds

Week 8: No Class: Reading week 20th-24th February

Week 9: 1st March: Earthquakes and urban areas in Canada

Week 10: 8th March: Drought in North America and its environmental and economic consequences

Week 11: 15th March: Overview of field trip itinerary

March 18-19th: Weekend Field Trip: Impacts of urbanization on watersheds and waterfronts e.g., the Port Industrial District, Frenchman's Bay, Hamilton Harbour, Love Canal, Hyde Park (NY State) etc.

Overnight accommodation on Saturday will be in Niagara Falls. Details to be announced.

Note*: A current passport with six months remaining or US entry visa is required. If you require a US visa*, *start applying as soon as possible.

Week 12: March 22nd: Class group presentations

Week 13: March 29th Class group presentations continue

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Assessment and distribution of marks

This course is also designed to sharpen your presentation and writing skills. Students will submit a brief in-class group presentation on an assigned topic (or of their choosing) and submit a short written report on a topic of their choice or from a list supplied by NE). Details of the format will be circulated later.

Written report: (due March 1st)	**50 Marks**
In-class group presentation:	**45 Marks**
Attendance on weekend field trip in late March:	**5 Marks**

Course material: The prime source of information is: Eyles, N. 1997: (Editor) Environmental Geology of Urban Areas, Geological Association of Canada Geotext No. 3 (especially Chapter 2: Environmental geology of the Greater Toronto Area).

Eyles, N. and Clinton, L. 2012. Toronto Rocks. Fitzhenry and Whiteside, Markham (in bookstore)

Eyles, N. 2002: Ontario Rocks. Fitzhenry and Whiteside, Markham (purchase from bookstore or Amazon.ca)

Other readings will be assigned on a week-by-week basis.

ACCESSIBILITY NEEDS

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact The UTSC Accessibility Services as soon as possible:
http://www.utsc.utoronto.ca/~ability/
We also suggest you also refer to the following University of Toronto Scarborough Library link:
http://utsc.library.utoronto.ca/services-persons-disabilities

PLAGIARISM

University of Toronto code of Behaviour on Academic Matters states that "it is an offense for a student knowingly to represent as one's own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e., to commit plagiarism."

For accepted methods of standard documentation formats, including electronic citation of internet sources please see the U of T writing website at:
http://www.writing.utoronto.ca/advice/using-sources/documentation

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