

ENGINEERING 8713: Municipal Engineering

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Communication	The best way to reach the professor is by email.		

CALENDAR ENTRY:

Water supply system overview; water consumption estimation; groundwater and surface water sources; oxygen demand and transfer; water treatment processes; water distribution systems and design software; sewer systems and design software; wastewater treatment processes; sludge handling; decentralized and on-site wastewater treatment.

COURSE DESCRIPTION:

An introduction to urban sustainability and global water will be included. Water treatment and resources are as indicated under major topics. Wastewater topics will be covered as time permits. Suggested prerequisites are Engi 4617 and Engi 5713.

PREREQUISITES: ENGI 4617, ENGI 5713, ENGI 7716

SCHEDULE: LECTURE: Wed., 12:00 noon -12:50 pm Room: EN 2050
Fri., 12:00 noon -1:40 pm Room: EN 2050

CREDIT VALUE: 3 credits

RESOURCES:

TEXT BOOK

- *Water and Wastewater Engineering: Design Principles and Practice, 2011, Mackenzie L. Davis, McGraw-Hill (e-book of selected chapters available at MUN bookstore, hard copy on reserve in QEII Library, TD 345 D36 2011, and electronically available through the QEII Library).*

REFERENCES

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- Quality Control*, Wiley-Interscience, New York, pp. 173-174.
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 - Greenberg, K., 2011, *Walking Home: The Life and Lessons of a City Builder*, Random House, Canada
 - *Healthy Canada by Design CLASP (Coalitions Linking Action and Science for Prevention)*, St. John's – May 2013
 - HOK, global design, architecture, engineering and planning firm, www.hok.com
 - Lai, A.K.T., 2008, *The Enabling Role of Engineers in Sustainable Development*, Keynote Address, *Environmental Geotechnology and Global Sustainable Development*, June 2-4, 2008, Hong Kong SAR
 - Libralato, G., Ghirardina, A.V., Avezzu, F., 2012, *To centralise or to decentralise: An overview of the most recent trends in wastewater treatment management*, *Journal of Environmental Management*, 94:61-68.
 - Newman, P., Kenworthy, J., 2011, 'Peak Car Use': *Understanding the Demise of Automobile Dependence*, *World Transport, Policy and Practice*, 17.1, Eco-Logica Ltd., <https://blogs.otago.ac.nz/amc/research/files/2011/07/Newman-Peak-Car-Use.pdf>
 - NRC-CNRC, 2005, **MIIP Report: Social Cost Considerations for Municipal Infrastructure Management**, Rahman, S.; Vanier, D. J.; Newton, L. A.
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 - Prud'homme, A., 2011, **The Ripple Effect: The fate of water in the Twenty-First Century**, Scribner, pp. 435.
 - Puentes, R., Tomer, A., 2009, *The Road...Less Travelled: An Analysis of Vehicle Mile Travelled Trends in the U.S.*, <http://www.brookings.edu/research/reports/2008/12/16-transportation-tomer-puentes>
 - Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, III, F.S., Lambin, E.F., ... Foley, J.A., 2009, *A safe operating space for humanity*, *Nature*, 461, 472-475.
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- Vital Water Graphics", 2002, United Nations Environment Program, 2002, <http://www.unep.org/dewa/vitalwater/index.html> .
- Yong, R.N., Mulligan, C.N., Fukue, M., 2007, **Geoenvironmental Sustainability**, CRC Press
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- Zimmweman, J.B., Mihelcic, J.R., Smith, J., 2008, *Global stressors on water quality and quantity*, *Environmental Science & Technology*, 42(12):4247-4254.

- Enrique Peñalosa: *Why buses represent democracy in action*, http://www.ted.com/talks/enrique_penalosa_why_buses_represent_democracy_in_action.html
- Janette Sadik-Khan: *New York's streets? Not so mean any more* http://www.ted.com/talks/janette_sadik_khan_new_york_s_streets_not_so_mean_any_more.html
- Jeff Speck: *The walkable city* http://www.ted.com/talks/jeff_speck_the_walkable_city.html
- Kent Larson: *Brilliant designs to fit more people in every city*, http://www.ted.com/talks/kent_larson_brilliant_designs_to_fit_more_people_in_every_city.html
- Mick Cornett: *How an obese town lost a million pounds* http://www.ted.com/talks/mick_cornett_how_an_obese_town_lost_a_million_pounds.html
- Saga City - *Our communities facing climate change*, <http://vimeo.com/28464164>

MAJOR TOPICS:

- Making cities sustainable, the role of engineers, Canadian healthy design initiatives, sustainable development areas, planetary boundaries, urbanization impacts
- Global water, global warming and water resources, water supply and treatment overview, St. John's water supply system, water usage, population forecasting (Ch. 2)
- Groundwater and surface water, water quality, stratification of lakes and rivers
- Coagulation and flocculation, static mixer design, paddle flocculator design (Ch. 3)
- Sedimentation, Type I and Type II settling, settling column tests, sedimentation basin design, high rate tube settlers (Ch. 7)
- Filtration
 - Granular filtration, granular filter headloss, backwashing bed depth, rapid sand filter design, wash trough design (Ch. 8)

- Membrane filtration, microfiltration and ultrafiltration, membrane flux, fouling and rejection, dead-end and cross-flow operation (Ch. 9)
- Reverse osmosis and nanofiltration, monovalent and divalent ions removal, carbonate buffer system (Ch. 6 and Ch. 3)
- Disinfection, chlorine, ozone and ultraviolet disinfection (Ch. 10)
- Overview of centralized and decentralized wastewater treatment, secondary treatment by suspended growth biological processes, nitrification, denitrification and phosphorus removal, oxidation ponds, sequencing batch reactor (Ch. 16)
- Municipal infrastructure costing and social costs, trenchless technology, common transportation myths

LEARNING OUTCOMES:

Upon successful completion of ENGI 8713, the student will be able to:

1. Appreciate aspects of the sustainable evolution of cities.
2. Identify environmental issues related to water and wastewater resources and treatment.
3. Understand the role of ethics in municipal engineering.
4. Identify and use valid sources of information.
5. Source, read and understand academic articles related to Municipal Engineering.
6. Appreciate the need to keep up to date with evolving environmental and societal issues.
7. Design components of water/wastewater treatment systems.
8. Describe the costs, social and financial, of design, maintenance and renovation of municipal infrastructure
9. Forecast population growth and estimate water consumption.
10. Discuss groundwater and surface water supplies.
11. Communicate technical information in a clear and effective manner.

ASSESSMENT:

		Approximate Due Dates
Individual class presentation	20%	Friday, January 31 st by 12:00 a.m.
Midterm 1	20%	Friday, February 14 th
Midterm 2	20%	Friday, March 7 th
Final exam	40%	April 9 th – 19 th

The midterm and final exams will be open book exams. Scientific calculators are the only electronic aid that will be permitted. Practice problems will help students prepare for exams. The exams will contain mostly numerical calculations but could have a small theoretical component. The electronic PowerPoint Presentation is to be received by the Professor by 12:00 a.m. on March 31st. (A late submission could result in a 5% deduction per day. Missing the first midterm exam will increase the weighting of the second midterm and final exams by 10% each. Missing the second midterm exam will increase the weighting of the final exam by 20%.)

ACADEMIC INTEGRITY AND PROFESSIONAL CONDUCT:

The highest level of academic integrity is expected from students. Please consult Memorial University’s Code of Student Conduct at <http://www.mun.ca/student/conduct>. Any student found to commit an academic offence will be dealt with according to the practices as outlined by Memorial University. The related calendar information is available at <http://www.mun.ca/regoff/calendar/sectionNo=REGS-0748>

INCLUSION AND EQUITY:

Students requiring physical or academic accommodations may speak privately to the instructor so that appropriate arrangements can be made. All conversations will remain confidential. Diversity of viewpoints, values, and backgrounds that each class participant possesses enrich the university experience. Insightful and comprehensive class discussion will be possible when dialogue is collegial and respectful across disciplinary, cultural, and personal boundaries.

STUDENT ASSISTANCE: Student Affairs and Services offers help and support in a variety of areas, both academic and personal. More information can be found at www.mun.ca/student. A specific resource is the Writing Centre at <http://www.mun.ca/writingcentre/about/>.

ADDITIONAL INFORMATION:

WINTER 2014 SCHEDULE, Dr. C. A. Coles

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9:00					
9:50					
10:00			Engi 9605 10:00 – 11:15 am EN 4020		Engi 9605 10:00 – 11:15 am EN 4020
10:50					
11:00					
11:50					
12:00	Engi 8713 12:00 noon – 1:15 p.m. Tutorial, EN 2050		Engi 8713 12:00 noon – 12:50 p.m. EN 2050		Engi 8713 12:00 noon – 1:40 pm EN 2050
12:50					
1:00					
1:50					
2:00			Office Hour EN 3004 2:10 pm – 3:00 pm		Office Hour EN 3004 2:10 pm – 3:00 pm
2:50					
3:00					
3:50					
4:00					
4:50					

Engi 8713: Municipal Engineering
Engi 9605: Water and Wastewater Treatment