GEOGRAPHY 453
FALL TERM 2019

URBAN STORMWATER MANAGEMENT

INSTRUCTOR: Dr. M. Stone
LECTURE: RCH T & Th 11:30 – 12:50 AM
OFFICE HOURS: ENV1 Room 112, W (1:00 - 3:00 PM)

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COURSE CONTENT AND ORGANIZATION

Stormwater management is an evolving field of study that includes aspects of environmental design, engineering, chemistry, hydrology, planning, finance and public administration. This course reviews the principles of urban stormwater management to provide a practical understanding of the development and implementation of effective management plans to mitigate environmental impacts of stormwater in urban environments.

Objectives of the course are to

1) understand the physical principles of urban hydrology and its relevance to stormwater quality and quantity management
2) consider the economic and environmental impacts of urban drainage and
3) review current design principles and their implementation in modern planning practices for stormwater management in urban watersheds.

TEXTBOOK

No text book is required in this course. Lectures are developed from a range of materials including textbooks, scientific papers and government documents. Some of the supplemental materials listed below as well as selected journal articles may be required reading. Each lecture will be posted on UW ACE. The following supplementary materials are relevant to the course.

STUDENT EVALUATION

2 Quizzes (Drop lowest mark)	30%
3 Labs @ 10% each	30%
Final Exam	40%

COURSE OUTLINE:

Sept 5	Course Introduction
Sept 10	Physical Impacts of Urbanization on Watersheds
Sept 12	Ecological and Biochemical Impacts of Urbanization on Watersheds
Sept 17	Field Trip to North Campus
Sept 19	Climate Change and Stormwater Management **Lab 1**
Sept 24	Planning Approaches for Stormwater Management
Sept 26	Drainage Systems for Urban Environments
Oct 1	Stormwater Quantity I
Oct 3	Stormwater Quantity II
Oct 8	**Quiz 1**
Oct 10	Stormwater Quality
Oct 15	Reading week – no classes
Oct 17	Reading week – no classes
Oct 22	Winter Road Maintenance and Road Salt Management - Environmental Indicators and Stormwater Monitoring Programs **Lab 2**
Oct 24	Stormwater Best Management Practices (BMPs)
Oct 29	Choosing Best Management Practices Details Stormwater Master Planning and Subdivision/Site Planning, Site Design / Low Impact Development
Oct 31	Source controls
Nov 5	Lot Level Controls
Nov 7	Conveyance Controls
Nov 12	End of Pipe Controls
Nov 14	**Quiz 2**
Nov 21	Green Roof Technology **Lab 3**

Nov 26 Operation, Maintenance and Costs (Capital and Operating)

Nov 28 Examples of Innovative Stormwater Management and Regulatory Permitting

Supplementary Materials References

Ontario Ministry of the Environment Stormwater Management Planning and Design Manual, http://www.ene.gov.on.ca/envision/gp/4329eindex.htm

The Minnesota Stormwater Manual
http://www.pca.state.mn.us/water/stormwater/stormwater-manual.html#manual

Waterloo Master Drainage Study http://www.city.waterloo.on.ca/DesktopDefault.aspx?tabID=1257

Toronto Wet Weather Flow Master Plan – Implementation Report
http://www.toronto.ca/water/protecting_quality/wwfmmp/pdf/implementation-report-2006.pdf

ADDITIONAL REFERENCES

Stormwater Planning: A Guidebook for British Columbia
http://www.env.gov.bc.ca/epd/epdpa/mpp/stormwater/stormwater.html

Davis, A. and McCuen, R. (2005) *Stormwater Management for Smart Growth*. Springer.

Novotny, V (Ed) 1995 *Nonpoint pollution and urban stormwater management*. Water Quality Management Library. Technomic Publishing, Lancaster.

Seybert, T. 2006 *Stormwater management for land development- Methods and calculations for quantity control*. John Wiley and Sons.

Walesh, S. 1989 *Urban surface water management*. Wiley Interscience.

ADDITIONAL COURSE CONSIDERATIONS

Plagiarism is defined as taking "intellectual property," such as words, drawings, photos, or artwork, etc., written or created by others, and passing it off as your own. When you submit a report or assignment with your name on it, it is assumed that you are the author of everything in the assignment except for those materials that are specifically identified as coming from other sources. Therefore, if you include sentences, photos, drawings or figures from other sources in a work report or lab report, the complete reference must be cited. This applies in particular to any material cut-and-pasted from the internet or any other electronic source. Failure to cite the source completely is plagiarism, an academic infraction with serious consequences under *University of Waterloo Policy 71*.

Academic Integrity: To create and promote a culture of academic integrity, the behaviour of all members of the University of Waterloo is based on honesty, trust, fairness, respect and responsibility.

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4, http://www.adm.uwaterloo.ca/infosec/policies/policy70.html

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.html

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals, http://www.adm.uwaterloo.ca/infosec/Policies/policy72.html