Physical & Environmental Sciences
UNIVERSITY OF TORONTO
SCARBOROUGH

FALL 2018
GRADUATE COURSE OUTLINE

EES1111H Freshwater Ecology and Biomonitoring
Lecture: Monday 9 am (sharp) – 11 am IC204
Laboratory: Monday 11 am – 2 pm EV222/224
Instructor: Jan Moryk
Email: jan.moryk@utoronto.ca
Teaching Assistant: Erik Dean (erik.dean@utoronto.ca)
NO OFFICE HOURS

COURSE DESCRIPTION

Freshwater Ecology & Biomonitoring introduces students to the relationships between freshwater organisms and their surrounding environment including the terrestrial components of the watershed which help shape the aquatic habitat and biological community structure. This course examines the physical, chemical, and biological factors that shape freshwater ecosystems such as lakes and streams. It will look at the influence of humans on freshwater ecosystems, with particular focus on urbanization. The course will also examine the concept of biological monitoring ("biomonitoring") using various organisms for detecting, measuring and assessing the significance of ecological change caused by human perturbations to freshwater ecosystems. Student will be exposed and made aware of various analytical techniques to test data relationships as well as the various legislation, policies and guidelines which influence biomonitoring activities and environmentally related decisions.

Students will be provided the opportunity to experience both field and laboratory practices related to biomonitoring as well as the management, analysis, interpretation, and presentation of data. This course will have a practical component in which students will have the opportunity to collect biological data from local streams and use it to test hypothesis related to aquatic community health and ecosystem condition/quality. Students will collect benthic macroinvertebrates using the Ontario Benthos Biomonitoring Protocol (OBBN) and will have the opportunity to learn how to identify the benthic invertebrates as well as obtain their OBBN certification if they so choose.

COURSE OBJECTIVES

At the completion of this course students should have knowledge of:

- key freshwater ecology concepts and relationships;
- techniques and standardized protocols used to conduct freshwater environmental monitoring in Ontario;
- how environmental monitoring can be used to answer research questions, evaluate responses to an environmental stressor, and/or assess the health of the aquatic system.
- Knowledge of using basic statistical methods to analyze, interpret, and present data.

- Basic knowledge of legislation, policy, and guidelines as it relates to biomonitoring and the management, conservation, and sustainable development of the environment.

At the completion of the course, participants will be provided with the information and knowledge to:

- Presented a concise talk describing a relevant issue in freshwater ecology in Southern Ontario
- Experience understanding the scenarios under which environmental legislation, policy, and guidelines apply.
- Experience in oral presentation and public speaking.
- The opportunity to obtain OBBN certification.

SCHEDULE

Week	Date (2018)	Lecture Topic	Lab Topic	Helpful Readings	Quiz/Assignment
1	10-Sep	Introduction and Biomonitoring 1 (OBBN Monitoring and program)	Introduction Lab (Meet your TA) and OBBN Theory of Sampling Methods application and safety	Wetzel - Ch 8	
2	17-Sep	Biomonitoring II (OBBN bio-assessment and Study Design)	Field work (you will be in the water collecting benthos using kick and sweep method) (weather dependent)	Dodds - Ch 8-11; Wetzel Ch 15-16, 22	
3	24-Sep	Threats to aquatic ecosystems	OBBN/Invertebrate identification	Walsh et al. 2005; Wallace et al. 2014	
4	1-Oct	Application of Biomonitoring, Study Design, hypothesis testing.	OBBN/Invertebrate identification	Dodds - Ch 7; Wetzel - Ch 3	
5	8-Oct	*Happy Thanksgiving – No Class/Lab*			
6	15-Oct	**Quiz 1: (written during lecture) - 25%** Properties of water; Movement of light/heat/ chemicals in water, Aquatic chemistry	OBBN/Invertebrate identification	Dodds - Ch 6	**Quiz #1 (written during lecture) - 25%**
7	22-Oct	**OBBN Written Test: (written during lecture) - 15%**	OBBN/Invertebrate identification	Wetzel - Ch 5-6 and Ch 9-14 Dodds - Ch 12 – 14;	**OBBN Written Test during lecture**
8	29-Oct	Physiography of flowing water (Lotic Systems) and ecological interactions	**OBBN ID: (Test in Lab) – 15%**	Dodds - Ch 8-11; Wetzel Ch 15-16, 22	**OBBN ID Test in Lab**

9	5-Nov	Head Water Drainage Features (HDF) and Ecological Interactions	HDF Assessment: Out in the field (weather dependent)	Dodds - Ch 19-23; Wetzel Ch 15-16, 22	
10	12-Nov	Physiography of lakes (Lentic Systems) and ecological interactions	Explain and Work on Assignment 1	Hilsenhoff 1987, 1988, Jones et al. 2006; Steedman 1988	
11	19-Nov	Aquatic Organisms: Fish Ecology and Ecosystem Function	Group Presentations (10%)		
12	26-Nov	**Quiz 2: (written during lecture) - 25%** Legislation, Policies, and Guidelines related to the Environment.	Group Presentations (10%)		**Assignment 1 due (submit during lecture) - 10%**
13	3-Dec		Group Presentation (10%)		

EVALUATION

Quizzes – 50% (2 x 25%)

Lab Quiz / OBBN – 30% = Written Test (15%) + ID Lab Test (15%)

Assignment 1 – 10%

Group Presentations – 10%

NO FINAL EXAM

Quizzes

There will be 2 quizzes completed in class. The quizzes will encompass the lecture material (not laboratory material) covered in the lectures prior to the quiz but will not be comprehensive (i.e. quiz 2 will not cover lecture material previously tested). Quizzes will be a combination of true and false and multiple choice, fill in the blanks, and application questions.

Presentation

To cover the diverse range of topics/issues in freshwater ecology, student(s) will choose a topic/current issue related to freshwater ecology and/or biomonitoring and prepare a maximum of 15 minute oral presentation. Presentations must include with visual aids (e.g. PowerPoint slides). Presentation will occur the last lecture and lab of the course. Topics must be approved by the course instructor to avoid duplication. As many if not all career paths these days require the employee to contribute and be part of a team setting, the presentations will be done in groups.

Evaluation will be carried out in accordance with the Graduate Grading and Evaluation Practices Policy (and how that policy is interpreted and applied in this Dept.)
http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/grading.pdf

EMERGENCY PLANNING

Students are advised to consult the university's preparedness site (http://www.preparedness.utoronto.ca) for information and regular updates regarding procedures relating to emergency planning.

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 shall be 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 UofT writing website at: http://advice.writing.utoronto.ca/using-sources/documentation/

The full Code of Behaviour regulations could be found from consulting
http://www.sgs.utoronto.ca/facultyandstaff/Pages/Academic-Integrity.aspx

WRITING AND ENGLISH LANGUAGE

As well as the faculty writing support, please see English Language and writing support at University of Toronto:
http://www.sgs.utoronto.ca/currentstudents/Pages/English-Language-and-Writing-Support.aspx
Students have commented that they found the latter address extremely helpful for writing term papers.

The following are also useful:

Sylvan Barnett, *A Short Guide to Writing About Art*. 5-7th edition (New York: Harper-Collins, 1997)
William Strunk Jr., E.B. White. The Elements of Style (New York: MacMillan Publishing)

LATE WORK
Late work will be deducted 10% per 24 hours for each 24 hours of being late.

READINGS

[Insert any references as required for the course. Confirm with faculty library that material is available, providing as soon as possible course readings and information on required materials.]