

Watershed Hydroecology, 2016 Winter

Instructor Information

Jane Liu

Office: Room 306, 45 St. George Street (Physical Geography Building)
Tel: 416-978-1672

E-mail: janejj.liu@utoronto.ca

Office hours: Wed. 3-4 pm, 45 St. George Street, PGB, room 306

Course Website on Blackboard: GGR413H in the My Courses module at
<http://portal.utoronto.ca>

Teaching assistant: Arnab Chakraborty

E-mail: arnab.chakraborty@mail.utoronto.ca

TA office hours and contact information will be posted on the Blackboard site after the term starts.

Course Description

Course title: Watershed Hydroecology
Course code: GGR413H

Hydrology and ecology are two inter-dependent disciplines of research. Hydroecology is a branch of ecology with emphasis on the effects of hydrological processes on living and non-living organisms and on their relationships in terrestrial and aquatic ecosystems. In particular, the redistribution of water in the landscape through surface and subsurface water flows regulates energy, mass and carbon fluxes from the land surface to the atmosphere, affecting plant distributions and productivity as well as regional and global climate. Principles and methods for hydrological and ecological simulations will be introduced, and a user-friendly, menu-driven hydroecological model will be used in practice to provide hands-on experience in hydroecological studies. Methods for handling spatial datasets, including those derived from remote sensing, will be taught. Students are evaluated based on the understanding of the principles taught as well as the practical ability to carry out computer simulations using the hydroecological model (programming skills are not needed).

In addition to teaching hydroecological principles, this senior-level course also aims at putting the knowledge you learned so far into practice to describe the basic physical, biological and ecological processes in terrestrial ecosystems. The basic quantitative

skills to be learned in this course would be useful for practical and research work after you graduate. This type of training is a must for physical geographers.

Prerequisites: 10.0 FCE's or discuss with Benjamin Pottruff (pottruff@geog.utoronto.ca) and me ASAP.

Lecture and Lab/Tutorial Schedule

Lecture: Wed. 11-1 pm, classroom: SS 2125

Tutorial/Lab: Thur. 2-3, classroom: SS 620

Week	Date	Topics	Lab	Assignments/Project
1	13 Jan	Introduction to Hydroecology, Review of basic hydrological processes and water potential concepts	No Lab	
2	20 Jan	Energy balance, Vertical water flow	No lab	
3	27 Jan	ET modeling	Assign. 1	Assignment 1 (20%)
4	3 Feb	Watershed water budget Lateral water flow	Assign. 1	
5	10 Feb	Radiation (direct, diffuse, shortwave, longwave)	Assign. 2	Assignment 1 due Assignment 2 (20%)
6	17 Feb	Reading week		
7	24 Feb	Photosynthesis models	Assign. 2	
8	2 Mar	Carbon cycle components Project ideas and requirements	Project	Assignment 2 due
9	9 Mar	Remote sensing of vegetation, Data format	No lab	
10	16 Mar	Mid-term test (70 minutes) Project consultation	Project	Mid-term (20%)
11	23 Mar	Coupled carbon and water cycles Project proposal presentation (5-10 minutes for each student)	Project	Proposal presentation (5%)
12	30 Mar	Project consultation, no lecture	Project	
13	6 Apr	Project presentations (5-10 minutes for each student)	Project	Result presentations (5%)
14	13 Apr			Project report due (30%)

Note: A list of lecture topics and assignments will be posted on the Blackboard website.

Textbook/References

As hydroecology is a relatively new branch of ecology or hydrology, no suitable textbook is found. The following papers and books are used as the key references (in order of importance):

1. Chen, J. M., X. Chen, W. Ju, and X. Geng, 2005. Distributed hydrological model for mapping evapotranspiration using remote sensing inputs. *J. Hydrology*, 305: 15-39.
2. Chen, J. M., J. Liu, J. Cihlar, and M. L. Guolden, 1999. Daily canopy photosynthesis model through temporal and spatial scaling for remote sensing applications. *Ecological Modelling*, 124: 99-119.
3. Liu, J., J. Chen, and J. Cihlar, Mapping evapotranspiration based on remote sensing: an application to Canada's landmass, *Water Resources Research*, 39, 1189, doi:10.1029/2002WR001680, 2003.
4. Hydroecology and Ecohydrology: Past, Present and Future, 2007. Edited by P. J. Wood, D. M. Hannah and J. O. Sadler. Wiley-Blackwell. Chichester, Hoboken.

Additional Readings

To be provided in class

Required Preparations

No strict pre-requisites are imposed for graduate students who are willing to take this course. Students are expected to have the basic mathematical skills (trigonometry, exponential and logarithmic functions, and basic calculus). Programming skills are not required. Some prior GIS and remote sensing training would be helpful. If you are not sure, please come to the first class for a quick assessment.

Evaluation

Assignment 1	20%	Due: Jan. 27, 2016
Assignment 2	20%	Mar. 9, 2016
Mid-term test	20%	Mar. 16, 2016
Project proposal	5%	Mar. 23, 2016
Project presentation	5%	Apr. 6, 2016
Project report	30%	Apr. 13, 2014

Two assignments and the project report are required to be submitted online (using Blackboard) on the due day before 6:00 pm.

The mid-term, project proposal (in a PPT file or alike) and project presentation (in a PPT file or alike) should be submitted in the class in hard copy for the mid-term and in soft copy for the PPT files on the due day.

Note: If you feel that you are having difficulty keeping up with class assignments or in understanding the material we are covering, please see me as soon as possible!

Academic Integrity

It is your responsibility, as a student at the University of Toronto, to familiarize yourself with, and adhere to, both the Code of Student Conduct and the Code of Behaviour on Academic Matters. This means, first and foremost, that you should read them carefully.

Plagiarism is an academic offense at the University of Toronto. Plagiarism is quoting (or paraphrasing) the work of an author (including the work of fellow students) without proper use of citation (and quotations marks when using an author's words). Students also should not be submitting any academic work for which credit has previously been obtained or is being sought, without first discussing with the instructor. Please consult the "Rules and Regulations" section of the Arts and Science Calendar (http://www.artsandscience.utoronto.ca/ofr/calendar/Rules_&_Regulations.html) for further information and check the 'How not to plagiarize' website at: <http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize>.

Accessibility

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 Accessibility Services as soon as possible: disability.services@utoronto.ca or <http://studentlife.utoronto.ca/accessibility>

Policy on Missed Term Work and Term Tests/Quizzes

Missed Term Work

Late assignments will be subject to a late penalty of 10% per day (including each day of the weekend) of the total marks for the assignment. Assignments submitted five calendar days beyond the due date will be assigned a grade of zero.

Academic accommodation can be made when an assignment is late or a student is unable to write a term test/quiz for University accepted, verifiable reasons beyond one's control.

Term Tests/Quizzes

There will be no re-writes for term tests/quizzes missed for University accepted, verifiable reasons. Instead the final project will be re-weighted by the value of the term test/quiz.

Green Course

This course is a Green Course. The instructor has committed to reducing this course's environmental impact.

