



ENVS*4030 Ecohydrology

Winter 2020

Sections(s): C01

School of Environmental Sciences Credit Weight: 0.50

Version 1.00 - January 6, 2020

1 Course Details

1.1 Calendar Description

This course introduces the emerging discipline of ecohydrology, which focuses on interactions and feedbacks between the elements of the water cycle, ecosystems and organisms. The emphasis will be on how hydrological processes regulate ecological ones but also on the mechanisms of ecological regulation of hydrological processes – which are often ignored in traditional hydrologic investigations. Students will learn about complex dynamics prevailing in ecohydrological systems using a blend of theory, quantitative tools and case studies. Students will also learn to synthesize recent literature, collect and analyze relevant data from open-access databases, and perform holistic ecohydrological system analysis through a term project.

Pre-Requisite(s): 1 of BIOL*2060 or GEOG*3610

AND 1 of GEOG*2460 STAT*2040 STAT*2060 STAT*2120 or STAT*2230

Restriction(s): None

1.2 Timetable

Lecture: Tuesdays & Thursdays, 8:30 am-09:50 am, MCKN, Room 309

2 Instructional Support

2.1 Instructor(s)

Genevieve Ali

Email: gali@uoguelph.ca

Telephone: +1-519-824-4120 x52740

Office: ECBL 2225

Office Hours: By appointment

2.2 Teaching Assistant(s)

Name	Details
Not applicable	Not applicable

3 Learning Resources

3.1 Recommended Resource(s)

Hydroecology and Ecohydrology: Past, Present and Future. 2007. P.J. Wood, D.M. Hannah and J.P. Sadler (eds.) (textbook)

3.2 Other

The instructor will provide links to interesting instructional videos, tutorials, websites and/or phone applications if and when appropriate. Google can also be a useful resource for this course.

4 Specific Learning Outcomes

By the end of this course, you should be able to:

1. Conceptualize and write a water balance equation – accounting for water storages and fluxes – for any landscape setting on Earth (LO1)
 2. Distinguish biotic from abiotic controls on hydrological processes (LO2)
 3. Analyze and confront lines of evidence provided by different types of ecohydrological data (LO3)
 4. Describe the underpinnings of basic ecohydrological theories and models (LO4)
 5. Critically read and assess peer-reviewed literature (LO5)
 6. Propose testable hypotheses regarding the impact of disturbances on the provision of hydrologically-oriented ecosystem services (LO6)
 7. Use ecohydrological principles of complexity and stability to guide sustainable environmental management (LO7)
 8. Further develop skills related to effective teamwork, oral communication and scientific writing (LO8)
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5 Teaching and Learning Activities

5.1 Lectures

The schedule below is tentative; it may be adjusted through the term as needed.

Tuesday, January 7: **No class**

Thursday, January 9: Syllabus review - What is ecohydrology?

Tuesday, January 14: Landscapes and watersheds

Thursday, January 16: Water cycle notions, blue and green water

Tuesday, January 21: **Quiz #1** / Precipitation and hydrologic abstractions

Thursday, January 23: **No class**

Tuesday, January 28: Precipitation and hydrologic abstractions

Thursday, January 30: Runoff generation

Tuesday, February 4: **Quiz #2** / Runoff generation

Thursday, February 6: Stream hydrographs

Tuesday, February 11: Stream hydrographs

Thursday, February 13: Environmental (or ecological) flows

Tuesday, February 18: **Reading week**

Thursday, February 20: **Reading week**

Tuesday, February 25: **Midterm**

Thursday, February 27: Introduction to critical reading

Tuesday, March 3: Data analysis project tutorial (see details below)

Thursday, March 5: Data analysis project tutorial (see details below)

Tuesday, March 10: Complex systems in ecology and hydrology

Thursday, March 12: Disturbance ecohydrology

Tuesday, March 17: Disturbance ecohydrology

Thursday, March 19: **Quiz #3** / Isotope ecohydrology

Tuesday, March 24: Isotope ecohydrology

Thursday, March 26: **Student presentations**

Tuesday, March 31: **Student presentations**

Thursday, April 2: **Quiz #4** / Bonus topic

* While attending lectures is not mandatory, please note that there are some course materials that will solely be discussed in class and will not be available on Courselink.

** The instructor will suggest a few topics for the last lecture of the term (“Bonus topic”). Students will have the opportunity to vote on the suggestions; the topic that will receive the largest number of votes will be introduced on April 2.

5.2 Labs

Not applicable

6 Assessments

6.1 Marking Schemes & Distributions

Assessment	Weight (%)
Quizzes #1, #2, #3 and #4	45
Midterm	30
Data analysis project	10
Critical reading project – Topic selection and project plan	5
Critical reading project – Final presentation	10
Total	100

6.2 Assessment Details

Quizzes #1, #2, #3 and #4

Students will have to provide answers to four, in-class quizzes that will each be 20 minutes in duration. Each quiz will have 5 to 10 questions (true/false, multiple-choice, short-answer) on topics

recently covered in class. Those quizzes will be closed-book mini-exams and will therefore require you to study your course materials regularly throughout the term. Specifically:

Quiz #1 (January 21) will focus on landscapes and watersheds, and water cycle notions;

Quiz #2 (February 4) will focus on precipitation and hydrologic abstractions;

Quiz #3 (March 19) will focus on complex systems notions and disturbance ecohydrology concepts; and

Quiz #4 (April 2) will focus on isotope ecohydrology.

At the end of the term, **only your three highest quiz marks (scores) will count**, each of them representing 15% of your overall course grade (for a total of 45%).

Please note that when a quiz is scheduled for a given day, it will take place at the beginning of the lecture period, i.e., at 8:30 am. Students who are more than 15 minutes late will not be allowed to write the quiz. Also note that there will be no possibility for you to take a make-up quiz. If you miss a single quiz, you will receive a score of zero for it and it will be your lowest score; it will not affect your overall course performance too badly since only the three best quiz scores will count towards your overall course grade. However, you may be in trouble if you miss more than one quiz. It is suggested that you treat all four quizzes as if each of them counted; then, if a real emergency arises, or you just don't do very well on one of the four quizzes, you will still have the option to drop one score (your lowest).

Midterm

The **midterm (February 25)** will be a 60-minute exam during which you will have to answer multiple choice questions and short-answer questions. This exam will be cumulative, which means that all topics covered from the beginning of the term until reading week will be subject to evaluation. The midterm will represent 30% of your overall course grade.

Data analysis project

Students will go through a concrete application of course concepts by using freely available software to assess environmental (or ecological) flows. During two lecture periods (March 3 and March 5), students will be required to bring a laptop to class and go through a tutorial to learn how to use the software. With the help of the instructor, students will also feed real data into the software and assess environmental (or ecological) flows in a watershed before and after a particular human-impact event, and then draw quick conclusions from their data analyses. Students will then write and submit a short, **individual report** on their analyses (maximum of 1000 words of text + flexible number of figures; worth 10% of the overall course grade). The due date for the data analysis project report is **March 19**.

Critical reading project

Critical reading is an important skill to master in environmental sciences in general and in ecohydrology, in particular. Hence, in this course, students will be trained in critically assessing and even challenging the conclusions put forward by researchers in journal articles. To accommodate the diversity of interests in the class, reading topics will not be assigned or imposed. Instead, students will be able to choose the topics they want to read about, as long as they respect the following guidelines:

- * Students should gather in groups of 2 or 3 to undertake their critical reading project.
- * Students should pick a component of the water cycle that they are particularly interested in – such as precipitation, evaporation, plant transpiration or runoff – or select an indicator of ecohydrological system response pertaining to streamflow regime (water quantity dynamics), water quality dynamics, or stream biotic integrity. Should students be interested in components or response indicators other than the ones listed here, they should consult with the instructor as early as possible during the term.
- * Students should select 2 papers (for groups of 2 students) or 3 papers (for groups of 3 students) that explicitly focus on the topic they selected. The only restrictions are that: 1) the selected papers are published in one of the following journals: *Ecohydrology*, *Water Resources Research*, *Hydrological Processes*, or *Hydrology and Earth System Sciences*; and 2) at least one of the selected papers focuses on changes occurring in response to a disturbance event such as a wildfire, a flood, a drought, logging, an insect infestation, a landslide, an earthquake, a volcanic eruption, resource extraction (e.g., coal mining), or climate change-induced permafrost thaw.

The evaluation of the critical reading project will be done in two stages:

- * Students will submit a short **topic selection and project plan** highlighting the topic they have chosen to focus on and why, together with the two or three papers they have elected to read. The topic selection and project plan is mandatory: it is due on **February 13** and will be worth 5% of your overall course grade.
- * Over the course of two lecture periods (**March 26 and March 31**), students will give **oral presentations** in class outlining the results of their critical reading exercise, in addition to submitting the slides of their presentation to the course instructor. All group members are required to take part in their group's oral presentation, which will count towards 10% of each student's overall course grade.

Further information about project scope, journal paper selection, critical reading tips and oral presentation templates will be discussed in class in advance of the various due dates.

7 Course Statements

7.1 Communication

You are required to check your uoguelph email on a regular basis, as important messages related to this course may be sent from Courselink. You are also required to check the course website (Courselink) regularly for special announcements, new documents to download (including guidelines for the data analysis and critical reading projects), etc. The course instructor will do her best to answer emails within 48 hours (weekends and holidays excepted). However, students should remember that the best time to communicate with the instructor is during class time, especially for project-related questions.

7.2 Group work

With regards to the data analysis project, you are allowed to work in groups on the data analyses but the short, written report that you hand in should be your own.

Group work is mandatory for the critical reading project.

7.3 Late work

Assignments (i.e., project reports in this course) are to be submitted to the instructor, electronically (via Courselink) and in hard copy, by 10 am on the due date. Email submissions will not be accepted unless agreed upon ahead of time with the instructor. All late assignments will receive a 10% deduction for each day, or part thereof, that they are late, up to a limit of five (5) days. An assignment that is 6 days late or more is guaranteed to receive a failing grade. Extensions will only be considered

for medical reasons or other extenuating circumstances, provided that they are discussed with the instructor well before the due date. Extensions will not be granted once the due date has passed.

You should remember that a technical difficulty is not a valid excuse not to turn in an assignment on time. Don't wait until the last minute as you may get behind in your work. Be sure to keep a back-up copy of all your assignments: to avoid any last-minute computer problems, save your assignments to a cloud-based file storage (e.g., Google Docs, Dropbox) or send copies to your email account so that should something happen to your computer, your assignment can still be submitted on time or re-submitted. Please note that these rules are not designed to be arbitrary, nor are they inflexible: they are designed to keep you organized, to ensure that all students have the same amount of time to work on assignments, and to help the instructor return marked materials to you in the shortest possible time.

8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals:

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

More information can be found on the SAS website: <https://www.uoguelph.ca/sas>

8.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

8.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars: <https://www.uoguelph.ca/academics/calendars>
