

University of Guelph
Department of Geography, Environment and Geomatics
GEOG*4150 Catchment Processes, 0.5 credits

Winter 2024 – W-F 10:00-11:20am, check WebAdvisor/CourseLink

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Office Hours: see CourseLink

Overview

In courses like GEOG 2000 and GEOG 3000 you investigated surficial processes and landforms, and worked to understand how aspects of Earth's systems work to build and denude a landscape. In analytical courses, you combined observations with quantitative reasoning to describe and characterize responses and features of the environment. GEOG 4150 builds on these foundations and aims to provide you with a unique experience. This course will challenge you through discussion and examination of the primary literature as well as linking to observations and working with different data sets during the laboratory assignments. Catchment processes are arguably one of the most interesting aspects of Geography, as these processes often influence Human-Environment flows (e.g., policy and planning). Catchment processes play a key role in ecosystem function and health in a variety of environments, understanding these processes is vital to assessing ecosystems. Our understanding of the watershed and processes within it are critical to evaluate changes in the landscape and/or changes in the processes themselves because of human activity, landscape evolution, and climate change.

Purpose:

In this course you will be part of a collaborative team of researchers whose aim it is to understand aspects of catchment processes. As a group we will explore the principle concepts and theories behind surface processes and their linkages to abiotic and biotic responses. Through laboratory work we will observe and test some of these primary ideas and work to understand the cutting-edge aspects of the field of earth surface processes and landforms.

Physical processes and human activities change the landscape and increasingly these factors work in tandem on the Earth's surface; these interactions are what inspire and drive my research and form the basis for the Winter 2024 offering of GEOG*4150: Catchment Processes. Changing climate, extreme rainfall events, and land use changes influence sediment transport and delivery, and this contributes to water quality degradation. The landscape response to these changes and how catchment processes work under varying conditions are important for us to study.

Calendar Description

This course examines and applies advanced geomorphology concepts and theories that are used to explain and understand how water shapes the Earth's surface. Fluid mechanics in fluvial environments are evaluated through discussions, computational modeling, and lab experiments.

Prerequisite(s): GEOG*3000

Territorial Acknowledgement

Acknowledging the territory on which we learn and work honours the relationship between lands/waters and the Indigenous ancestors and stewards of them.

The University of Guelph rests on the traditional territory of the Attawanderon people. We therefore acknowledge the Attawanderon people and offer our respect to Anishinaabe, Haudenosaunee and Métis neighbours as the university and community strive to strengthen our relationships with them. We also recognize the significance of the Dish with One Spoon Covenant to this land. The Dish with One Spoon Covenant is a peace agreement made between Indigenous nations before the Europeans arrived. It characterizes our collective responsibility to each other and Mother Earth -we should take only what we need, leave enough for others and keep the dish clean.¹

¹ This acknowledgement is adapted from the University of Guelph Indigenous Resource Centre and Student Life.

Statement on Expectations for Inclusivity

Different perspectives and lived experiences shape who we are and make our communities stronger. I want everyone in our class to feel that they belong and that their ideas, perspectives, and lived experiences are important. It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups.

Learning Outcomes

Students who have actively engaged with the course can expect the following outcomes, which are aligned with University Learning Outcomes ([link](#)) and the Learning Outcomes identified by the Department of Geography, Environment & Geomatics ([Link](#)).

1. Analyze the Earth as an integrated human-environment system.
 - Examine and describe dynamic flows, interactions and exchanges at watershed scales and through variable temporal scales
 - Embed these integrated components within Catchment Processes and the course themes for this offering
2. Critically and independently evaluate the primary literature for one of the key themes in Catchment Processes and contextualize the selected topic within Geosciences.
 - Integrate knowledge from previous courses and material used in this course to build a critical annotated bibliography
 - Synthesize established/foundational theories and concepts and situate these within contemporary and modern ideas
3. Collect and analyze Catchment Process data and generate interpretations that demonstrate key Catchment Process concept interrelatedness.
 - Execute data collection in the lab and/or in the field
 - Complete data analysis following standard procedures in the Geosciences
 - Draw interpretations from the data analysis and contextualize these within the appropriate literature
 - Utilize appropriate visualizations and terminology
4. Investigate complex real-world challenges related to Catchment Processes.
 - Define variables contributing to real-life Catchment Processes issues/problems
 - Actively reflect and participate in class discussions
 - Utilize appropriate terminology
5. Develop and improve oral communication skills related to key Catchment Processes concepts.
 - Self-assess initial oral communication skills
 - Establish oral communication skills to improve/enhance
 - Recognize the variety of oral communication opportunities
 - Utilize appropriate terminology
6. Construct and curate skills and attributes expected for individuals working and interacting within the Geosciences.
 - Identify and self-reflect on the skills and attributes of Geoscientists
 - Confidently and effectively communicate using appropriate and concise language and terminology
 - Mobilizing and transcribing knowledge and skills

Course Organization

Our course will combine lectures, seminars/discussions, presentations and labs for a rich and active learning experience. Formally we are scheduled to meet twice a week on Wednesday and Friday 10-11:20am, this time slot will be used for lectures, discussions/seminars, lab demos and presentations.

Lectures: Wednesday & Friday, 10 – 11:20 am (location see WebAdvisor or CourseLink)

Labs: refer to WebAdvisor for dates/times and location

Please stick with your original lab assignment section.

Lab details are preliminary and will depend on TA resources that are as of now (Nov 13) unknown.

Textbook

There is no official text for this course. If you used Robert 2003 (Fluvial Processes: An introduction to fluvial dynamics) in GEOG*3000, you will find it useful for GEOG*4150.

Additionally, we will rely on primary, peer-reviewed literature, and several e-books available to UofG users.

To get started, be sure to download the following e-books from the UofG Library:

Rhoads, B. L. (2020). River Dynamics: Geomorphology to Support Management (1st ed.). Cambridge University Press. <https://doi.org/10.1017/978110816410>

We will be working with Ch 16 in the second half of the course

Rowiński, Paweł., & Radecki-Pawlik, Artur. (Eds.). (2015). Rivers – Physical, Fluvial and Environmental Processes (1st ed. 2015.). Springer International Publishing. <https://doi.org/10.1007/978-3-319-17719-9>

We will be working in Ch 12 by Mike Church in the first half of the course, but the full book is incredibly useful to anyone working in river science.

Church, M. (2015). Channel Stability: Morphodynamics and the Morphology of Rivers. In: Rowiński, P., Radecki-Pawlik, A. (eds) Rivers – Physical, Fluvial and Environmental Processes. GeoPlanet: Earth and Planetary Sciences. Springer, Cham. https://doi.org/10.1007/978-3-319-17719-9_12

If you would like other recommendations, please don't hesitate to ask as I can give you several, in general any upper-level fluvial geomorphology text will serve you well (e.g., Robert 2003, Charlton 2008, Wohl 2020). In addition to that resource, we will be doing activities and readings from recent journal articles, links and/or pdfs will be available on CourseLink

TA

TBA

The TA is your primary go-to for questions related to the on-campus labs and assignments.

CourseLink

Schedules, updates, links, etc. will be posted on our CourseLink page, check this often. Be sure that you check the email associated with your CourseLink account, as this will be the primary way in which I communicate with you outside of class.

Evaluation Summary: PRELIMINARY fully depends on TA resources

Experiment Modules (2 or 3 labs total, week ~2-7; or multi-week experiment)	30%
Annotated Bibliography & Presentation (Apr 3 or Apr 5)	30%
Final Exam (scheduled in final exam period)	30%
Engagement/Participation (Weekly check-ins and reflections)	10%

Experimental Modules (30% of the final grade) For W24 This is really uncertain – depends on TA resources

The primary goal for the labs in this course are slightly different from GEOG*2000 and GEOG*3000, the goal here is to practice your data analysis/processing skills and report writing.

W24 note – depending on resources – I see a couple of options here

1 – working in small groups, (1-2 people) run a multi-week experiment in O20 (in one of the flumes or stream tables) to evaluate a fundamental question in fluvial processes, this work involves at least 2 oral presentations, a poster presentation, and final report, and will take place over week 2-7 of the semester.

2 – Complete lab assignments in the first half of the semester, each report is ~2000 words (plus references, figures, tables), and will be due two weeks after the lab work is conducted (but it could be completed in 1 week, you are given 2 to help manage other schedule demands). The lab topics will look at bedload transport rates and boundary shear stress estimates, fish behaviour and fish position relative to flow (video work), sediment transport estimates and modeling. In addition, given resources and feasibility, I would love to do a field trip on a weekend, for students completing the field trip report, this would take-away one of the above assignments.

Critical Annotated Bibliography & Presentation (Annotated bib 20% + presentation 10% = 30% of the final grade)

Research skills are in-demand, and often listed among the top duties and qualifications for most careers in Geosciences. This assignment will get you thinking about topics in Catchment Processes and allow you to dig into something that maybe you haven't had a chance to study independently. Most importantly it will help you to practice and refine key research skills.

- Presentation is Apr 3 or 5, file uploaded by 11:59pm night before presentation.
- Final file submission is due last day of classes (Monday April 8, 11:59pm)

Final Exam (30% of the final grade, scheduled during the final exam period, in-person)

The final exam will consist of written response questions (almost mini-essays) where you demonstrate your understanding of the key topics discussed in the course and where appropriate link these ideas to key challenges outlined in the course. Strong answers will use examples from the course and link concepts together. You will be permitted to use hand-written notes during the exam, these will be submitted with your exam (you can pick them up the week after). Digital resources are not permitted.

Engagement (10% of the final grade)

Active listening, independent reflection, and respectful discussion of ideas, concepts, and challenges are important aspects for a positive and inclusive learning environment (or classroom climate). As an instructor I value contributions from everyone and strongly believe that these activities follow the pedagogy related to positive learning environments and learner-experiences. Thus, this is valued as part of the overall assessment in the course. In our first class we will discuss expectations around engagement – it isn't just about talking a lot or talking the most/loudest, or perfect attendance. Please speak to me if you have any concerns about this (or any) aspect of the course.

Course Content

Our course content is organized around several themes in Catchment Processes. Certainly, there is room to go beyond these topics and I encourage you to do this through your individual assessments (labs, annotated bibliography and reflections).

Core Themes:

- Catchment Processes
 - Scales, models, land use, Southern Ontario Contexts
 - Glacial legacies
 - Urban contexts
- Channel Stability
- Channels in winter and through early spring
- Ecohydrology (broadly)
- Watercourse and channel restoration
- Challenges in Catchment Processes

W24 Schedule – For reading assignments please go to the appropriate section in CourseLink, for links to PDFs.

Week	Date	Topic	Readings – <u>to be completed prior to class</u>	Reminders
1	Jan 10	Course organization, expectations, reading discussion	Course Outline & Review CourseLink Materials See CourseLink (week 1)	<i>Complete 2000 & 3000 review activity for Jan 17</i>
	Jan 12	Lit searches, reading peer-reviewed papers, discussing/presenting papers, Critical Annotated Bibliography Assignment Intro	See CourseLink (week 1) Crit Ann Bib Assignment Info	<i>Labs start next week</i>
2	Jan 17	Geomorphology – (re)setting the page Data in Geomorph (QA/QC) Lab assignments in 4150	Completed review sheet See CourseLink (week 2) Writing conventions for 4150	
	Jan 19	Catchments – simple – complicated Scale, land use, drainage density S. Ontario Contexts	Desloges et al 2020 (skim) See CourseLink (week 2)	
	Lab 1		Review instructions before lab	<i>Due in 2 weeks</i>
3	Jan 24	Catchment Processes – S. Ontario Context -glacial legacies	Desloges et al 2020 (in detail) See CourseLink (week 3)	
	Jan 26	Catchment Processes – S. Ontario Context -glacial legacies	Desloges et al 2020 (in detail) See CourseLink (week 3)	
	Lab 2		Review instructions before lab	<i>Due in 2 weeks</i>
4	Jan 31	Catchment Processes – S. Ontario Context -urban streams	See CourseLink (week 4)	
	Feb 2	Catchment Processes – S. Ontario Context -urban streams	See CourseLink (week 4)	
5	Feb 7	Channel Stability	See CourseLink (week 5) Church 2015	
	Feb 9	Channel Stability	See CourseLink (week 5) Church 2015	
	Saturday Feb 10	Winter Fieldwork & Reporting	Review instructions & expectations before Sat.	<i>Due Mar 1, 2024</i>
6	Tuesday Feb 14	Channels in winter	See CourseLink (week 6)	
	Thursday Feb 16	Channels in winter and early spring	See CourseLink (week 6)	
	Lab 4		Review instructions before lab	<i>Due in week 8</i>
READING WEEK				

The lecture/topic schedule is subject to change depending on the pace of the class and the semester; your understanding in this is appreciated.

Week	Date	Topic	Readings – to be completed prior to class	Reminders
7	Feb 28	Ecohydrology	See CourseLink (week 7)	Sign-up for your Annot Bib presentation date
	Mar 1	Ecohydrology	See CourseLink (week 7)	
8	Mar 6	Watercourse & Channel Restoration – introduction	See CourseLink (Restoration)	
	Mar 8	Restoration – approaches	See CourseLink (Restoration)	
9	Mar 13	Restoration – approaches	See CourseLink (Restoration)	
	Mar 15	Restoration – approaches	See CourseLink (Restoration)	
10	Mar 20	Restoration – Forms or Function (or both)	See CourseLink (Restoration)	
	Mar 22	Restoration – specific examples & challenges – fish passage, hab conservation	See CourseLink (Restoration)	
11	Mar 27	Watercourse restoration – conclusions	See CourseLink (Restoration)	Bibliography Presentations next wk
	Mar 29	No Class	None	
12	Apr 3	Critical Annotated Bibliography Presentations		
	Apr 5	Critical Annotated Bibliography Presentations		
	Apr 8 (Monday)	Challenges in Catchment Processes Final Exam Prep/Review Course wrap-up	See CourseLink (week 12, tba)	Crit Annot Bib due today!
	Monday Apr 10 - Critical Annotated Bibliography Due, Monday April 8, 11:59pm			
Final Exam		Date, Time & Location TBA		

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How to succeed in this course

I believe success is possible in anything you set your mind to, therefore starting this class and each task associated with it with an engaged, positive and excited attitude puts you well on your way to an excellent experience. There are a few other items that will help you to succeed. Come to class prepared to participate. Ask questions; ask the question more than once if needed. Complete your assignments, read them over, read the questions, did you answer and address all the issues? When you are proud of your assignment, hand it in. Talk to me about your assignments, before you submit them and after you get feedback. Discussing issues in class, in the hall, in the lab or where ever, often makes the point and the issue clearer than just considering it once. Learning and comprehending concepts is not done through memorization. Have fun, I always remember fun things, and events that were mediocre or uninteresting I easily forget. If you come with the right attitude I will do my best to make this a fun, interesting and maybe even exciting class – I get excited about catchment processes.

Important resources available to all University of Guelph students:

Writing Services -- <https://www.lib.uoguelph.ca/get-assistance/writing>

Studying/Time Management/Learning Services -- <https://www.lib.uoguelph.ca/get-assistance/studying>

Research Services -- <https://www.lib.uoguelph.ca/get-assistance/research-help>

Well-being -- <https://www.uoguelph.ca/mentalwellbeing/front-page>

Turnitin

In this course we use Turnitin integrated with the CourseLink Dropbox tool to detect potential plagiarism, unauthorized collaboration, and/or copying as part of the ongoing efforts to maintain academic integrity at the University of Guelph. All materials submitted to the Dropbox will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting inappropriate use. Use of the Turnitin.com service is subject to the Usage Policy posted on the

Turnitin.com site. A major benefit of using Turnitin is that students will be able to educate and empower themselves in preventing academic misconduct. In this course you may screen your own assignments through Turnitin as many times as you wish before the due date. You will be able to see and print reports that show you exactly where you have properly and improperly referenced outside source and materials in your assignment. Please contact me if you have questions or concerns about this software.

E-mail Communication

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

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. See the undergraduate calendar for information on [regulations and procedures for Academic Consideration](#).

Drop Date

The last date to drop one-semester courses, without academic penalty, is April 8, 2024. For [regulations and procedures for Dropping Courses, see the Undergraduate Calendar](#).

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.

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities (soon to be re-named Student Accessibility Services) as soon as possible.

For more information, contact SAS at [519-824-4120](tel:519-824-4120) ext. 56208 or email sas@uoguelph.ca or see the [Centre for Students with Disabilities website](#).

Academic Misconduct

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 discourages misconduct. 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. The [Academic Misconduct Policy is detailed in the Undergraduate Calendar](#)

Recording of Materials

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

Resources

The [Academic Calendars](#) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.