Instructor:  Dr. Paul Villard  
Email: pvillard@uoguelph.ca  
Virtual Office Hours: Wednesday 5:30-6:30, Teams-based

**Alternative Delivery “Hybrid Remote Learning”:**

The in-class/lecture portion of the course will be offered in a synchronous format. I will meet with the class virtually, in real time, just as if we were in-person. We will meet in the Teams environment. You will be provided confirmation of this format in the first lecture, and through email. Given the small class size, class participation is still anticipated in the virtual environment. Recordings of lectures will not be posted. The lecture materials will be supplemented with posted videos (not of the lectures themselves) and readings. Course expectations, schedule, assignments, and format will be reviewed in the first lecture.

Required resources: Access to a webcam or other digital video capability is highly recommended for in-class discussions.

The laboratory/assignments for this course will be asynchronous, or synchronous where in-person laboratory work is required. This will be set in discussion with the TA. You will be provided with materials for each assignment. It is up to you to complete these on your own time. The TA will support in laboratory activities and assist completion of assignments through their office hours, communicate through CourseLink, and/or email.

**Overview:**

Your career as an undergraduate student has led you through analytical and theoretical courses. In courses like GEOG 2000, GEOG 2110 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. You will gain a better understanding of the scientific principles and their application through discussion and examination of the primary literature, recent examples of the application of theory to real-world situations, as well as linking observations and working with different data sets during assignments.

Catchment processes are arguably one of the most interesting aspects of Physical Geography, as these processes often influence Human-Environment interactions. 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 cycles/budgets, landscape and/or changes in the processes themselves because of human activity, landscape evolution, and climate change. The theme of human and catchment interaction will be discussed in the context of the application of the science.

**Purpose:**

In this course you will become part of a collaborative team 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 its linkages to abiotic and biotic responses. Through assignments we will observe and test these primary ideas and work to understand the theory and applications of the field of earth surface processes and landforms. Through lectures,
assignments, and projects, the application of the science will be explored. This will be reinforced through case studies. We will also review the tools used to monitor and take measurements within catchments.

Physical processes and human activities change the landscape and increasingly these factors work in tandem on the Earth’s surface; these interactions form the basis for the Winter 2021 offering of GEOG*4150: Catchment Processes. Climate adjustments, extreme rainfall events, and land use changes (urbanization) influence sediment transport and delivery, and this can result in hazards, reduced ecological function, and impact water quality. The landscape response to these changes and how catchment processes work under varying conditions are important for us to study.

**Learning Outcomes:**
Students who have actively engaged with the course can expect the following learning outcomes, which are aligned with the 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 flows, interactions and exchanges at watershed scales and through variable temporal scales
   - Embed these integrated components within Catchment Processes
2. **Critically** and independently **evaluate** the primary literature for one of the key themes in Catchment Processes and examine the selected topic within Geosciences.
   - Integrate knowledge from previous courses and material used in this course to compose a critical literature review
   - Synthesize established/foundational theories and concepts and situate these within contemporary and modern ideas
3. **Analyze** Catchment Process data and generate interpretations that demonstrate key Catchment Process concept interrelatedness.
   - 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

**Organization:**
Our course will combine lectures, seminars, and assignments for a rich and active learning experience. Formally we are scheduled to meet virtually once a week for ‘lectures’ on Wednesday 7:00 – 9:50 pm, this time slot will be used for lectures, seminars, and presentations.

Virtual Lectures: Wednesday, 7:00 – 9:50 pm, lectures will be offered in a synchronous format. We will meet in the Teams environment. You will be provided confirmation of this format in the first lecture and through email.

Labs: Labs will be released at least two weeks before they are due. The laboratory/assignments for this course will be asynchronous or in laboratory (in-person), as required. You will be provided with all materials for each
assignment. It is up to you to complete these on your own time. The TA will support laboratory/assignments through physical support in the laboratory, their office hours, and communicate through CourseLink and/or email.

There will be field and on-campus components to the assignments. If required, due to health concerns, laboratories/assignments will be modified to be completed virtually. Assignments begin in Week 2, refer to the schedule included below.

Textbook:
There is no official text for this course. If you would like a recommendation, I can give you several. We will be doing activities and readings from recent journal articles.

TA:
The TA is your primary go-to for questions related to the labs.
Karine Smith karine@uoguelph.ca

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:
- Lab Modules (complete 4/5 total) 40%
- Catchment Process Group Presentation and Report (1 group presentation) 20%
- Class discussion engagement (throughout the semester, with a focus around lecture concept discussions and presentations) 10%
- Take-Home Final Exam (based on assigned readings and course materials) 30%

Lab/Assignment Modules (complete 4/5, 40% of the final grade)
Certainly, one of the benefits of our course is its size. In an effort to manage schedules and competing course/s requirements, there is a level of choice for you in this section of the course assessment. You are welcome and encouraged to review all laboratory/assignment materials, but you only need to complete the requirements and submit the report for four out of the five assignments. Below is a summary of the lab/assignment modules this semester; they are presented in the scheduled order, and each submission is worth 10% of your final grade (4 modules * 10% = Lab Modules are 40% of your final grade). The labs are offered in the indicated weeks and are typically due one week after they are introduced. Each lab report should be ~1500-2000 words, plus references, figures, tables.
- Possible Lab Module Topics:
  - Hydrograph Separation
  - Experiment Design: Rainfall Intensity and Denudation/Erosion
  - Transport and Traps: Sediment and Phosphorus Yield
  - Channel Morphology and Restoration
  - Ice Development over Streams

Group Presentation and Annotated Bibliography Report (20% of the final grade, one group report and one group presentation)
The purpose of this component of the course is to allow you to ‘dig’ into a particular aspect of Catchment Processes. Topics will be modelling based. The objective is to examine physical processes and to develop a mental/analytical model of the exchanges, source and sinks or budget within the catchment. An example will be discussed. The goal is to produce a thought out model based on a critical review of the literature related to your chosen topic.
- Key Deliverables
  - Topic selection and approval by noon at the end of Week 3
  - Group Presentation (Week 5 or 6) – 15 minutes total, key concept and ideas
Oral communication is an important aspect of Geosciences, and like most things, the more opportunities we have to do it, the better we are at that task. The group presentation provides an opportunity to work with a team and lead the class through a particular topic and subsequent discussion. More information about groups, dates, and topics will be discussed during the first week of class.

- Group Report – Annotated Bibliography along with a written description of the model/system. Bibliography to include ~10+ papers and it is to be submitted on same day a group presentation (Week 5 or 6). Report should outline key concepts related to selected topic and draw on existing relevant literature.

**Engagement (10% of the final grade)**
Active listening, independent reflection, and respectful discussion of ideas, concepts, challenges, and just plain fun or (and) interesting stories are an important aspect 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 learning environments and learner-experience. As such this is valued as part of the overall assessment in the course. As a class we will discuss and develop expectations around engagement, this includes (at the very least) a beginning, midway, and end of the term assessment – 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.

**Final Take-Home Exam (30% of the final grade)**
The final take-home exam will include a series of questions based on lecture material, case studies, and prescribed readings. Please note that several guest lecturers are scheduled near the end of the semester. These are professionals with real world experience in the application of catchment processes and fluvial geomorphology. There could be questions on the take-home exam related to these lectures as well. In my experience, attendance at lectures has fundamentally impacted final grades with regards to take-home exams. I strongly encourage attendance and participation for all lecture sessions.

**Course Content**
Our course content is organized around several themes in Catchment Processes.

Core Themes:
- Watershed Hydrology – Runoff-Response Processes
- Fluvial Systems – Geomorphic Scales, Sediment Cascades
- Channel Form and Function – Morphology and Related Processes
- Instream Ecology
- Ice and System Thresholds
- Channel Restoration
- New Concepts in Catchment Science
  - Connectivity in Geomorphology
  - Sources and Sinks – Strings and Beads
  - Water Balance – Urban Hydrology
  - Hazard Delineation
  - Habitat Channel Restoration
**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 wherever, 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](https://www.lib.uoguelph.ca/get-assistance/writing)
- **Studying/Time Management/Learning Services** -- [https://www.lib.uoguelph.ca/get-assistance/studying](https://www.lib.uoguelph.ca/get-assistance/studying)
- **Research Services** -- [https://www.lib.uoguelph.ca/get-assistance/research-help](https://www.lib.uoguelph.ca/get-assistance/research-help)
- **Well-being** -- [https://www.uoguelph.ca/mentalwellbeing/front-page](https://www.uoguelph.ca/mentalwellbeing/front-page)
W21 Schedule – For reading assignments please go to the appropriate section in CourseLink, for links to PDFs.

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<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Deadlines</th>
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<tbody>
<tr>
<td>1</td>
<td>• Outline, Organization, Schedule</td>
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<td>• Expectations (yours and mine)</td>
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<td></td>
<td>• Core Themes</td>
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<td>• Group Presentation Discussion/Outline</td>
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<td>• Catchment processes – review/intro</td>
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<td><strong>NO LABS WEEK 1</strong></td>
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<td>2</td>
<td>• Equipment Exhibit – Acoustic Doppler Current Meter - Simple</td>
<td>Group Topic Selection</td>
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<td>• Assigned Reading Discussion</td>
<td>Assigned Readings</td>
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<td>• Group Presentations Update – Have a Topic</td>
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<td></td>
<td>• Watershed hydrology/Water Balance (Cont.)</td>
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<td>• Assigned Reading Discussion</td>
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<tr>
<td><strong>Lab 1 and 5</strong></td>
<td><strong>Lab 1 Hydrograph Separation and Lab 2 Ice Development over Streams (Released)</strong></td>
<td>Lab 1 due in 1 week, Lab 5 due in Week 8</td>
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<td>3</td>
<td>• Equipment Exhibit – Rain Gauges</td>
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<td></td>
<td>• Watershed Hydrology/Water Balance</td>
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<td><strong>Lab 2</strong></td>
<td><strong>Experiment Design: Rainfall Intensity and Denudation/Erosion</strong></td>
<td>Due in 1 week</td>
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<td>4</td>
<td>• Equipment Exhibit – Composite Sampler</td>
<td>Assigned Readings</td>
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<td></td>
<td>• Fluvial Systems</td>
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<td>- Headwaters, Production Zones, Transfer Zones, Deposition Zones</td>
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<td>- Modelling</td>
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<td>- Fish Passage Model Example</td>
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<td></td>
<td>• Assigned Reading Discussion</td>
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<td><strong>Lab 3</strong></td>
<td><strong>Transport and Traps: Sediment and Phosphorus Transport and Yield</strong></td>
<td>Due in 1 week</td>
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<td>5</td>
<td>• Continue Fluvial Systems</td>
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<td></td>
<td>- Sediment/Nutrient Budgets</td>
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<td>- Source and Sinks</td>
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<td>- Water Balance</td>
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<td>- Fish Passage Model Example</td>
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<td><strong>Lab 4</strong></td>
<td><strong>Channel Development and Channel Restoration</strong></td>
<td>Due in 2 weeks</td>
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<td>6</td>
<td>• Continue Fluvial Systems</td>
<td>Assigned Readings</td>
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<td>• Assigned Reading Discussion</td>
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<td><strong>Reading Week – no class or labs -- -- Reading Week</strong></td>
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<td>7</td>
<td>• First Day of Group Presentations</td>
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<td>• Equipment Exhibit – Acoustic Doppler Velocimeter</td>
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<td>• Channel Morphology</td>
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<td><strong>Lab 5</strong></td>
<td><strong>Ice Development over Streams</strong></td>
<td>Due in 1 week</td>
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<td>8</td>
<td>• First Day of Group Presentations</td>
<td>Group Presentations</td>
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<td>• Connectivity</td>
<td>Submission of Group Annotated Presentation</td>
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<td>• Ecology in flowing streams</td>
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<td>• Habitat</td>
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<td>• Fish passage and spawning</td>
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<td>• Life under ice</td>
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<td>9</td>
<td>• Second Day of Group Presentations</td>
<td>Group Presentations</td>
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<td>• Connectivity, Ecology, Fish Passage, Ice (Cont.)</td>
<td>Submission of Group Annotated Presentation</td>
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<td>10</td>
<td>• Watercourse Restoration Design</td>
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<td>11</td>
<td>• Invited Lectures: Fish Passage, Habitat Modelling, Use of Drones for Monitoring, Hydrometric Measurement and Stormwater Management</td>
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<td>12-13</td>
<td>• Planning and Catchment Science</td>
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<td>• Careers</td>
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The lecture/topic schedule is subject to change depending on the pace of the class and the semester; your understanding in this is appreciated.
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. It is also the last day to apply online for the Credit/No Credit grading option for eligible W21 elective courses. 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 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.
Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website [hyperlink to the website] and circulated by email.

Illness

The University will not require verification of illness (doctor's notes) for the fall 2020 or winter 2021 semesters.