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 and problems, 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 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 in order to evaluate changes in the landscape and/or changes in the processes themselves as a result 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 laboratory work 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, labs, and projects, the application of the science will be explored. This will be reinforced through case studies.

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 2020 offering of GEOG*4150: Catchment Processes. Changing climate, extreme rainfall events, and land use changes influence sediment transport and delivery, and this contributes to hazards, reduced ecological function, and water quality degradation. 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. Collect and analyze Catchment Process data and generate interpretations that demonstrate key Catchment Process concept interrelatedness.
   - Execute data collection
   - 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 labs for a rich and active learning experience. Formally we are scheduled to meet once a week for ‘lectures’ on Wednesday 7:00 – 9:50 pm, this time slot will be used for lectures, seminars, and presentations.

Lectures: Wednesday, 7:00 – 9:50 pm
Labs: Monday 2:30-4:20; Wednesday 2:30-4:20; Thursday 1:30-3:20

Please stick with your original lab assignment section. Labs 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.
Alex Scott   ascott10@uoguelph.ca (Office: Hutt 341)

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%
Group Presentation and Annotated Bibliography Report (1 group presentation) 15%
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) 35%

Lab Modules (complete 4/5, 40% of the final grade)
Certainly, one of the benefits of our course is its size and thus access to the Physical Geography Teaching Lab space, it is the intent of this course to make use of these resources. However, 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 attend all labs (there are 5 total) but you need to complete the requirements and submit the report for only 4 of the labs, two of which must be lab activities that involved data collection (dc). Below is a summary of the lab 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 1 week after they are introduced. Each lab report should be ~1500-2000 words, plus references, figures, tables.

- Lab Modules (dc indicates that this lab includes data collection, two completed labs must be dc):
  - Infiltration (dc), Week 1
  - Hydrograph Separation, Week 2
  - Experiment Design: Rainfall Intensity and Denudation (dc), Week 3
  - Sediment Transport and Sediment Yield (dc), Week 4
  - Channel Development (dc), Week 5

Group Presentation and Annotated Bibliography Report (15% 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. The goal is to produce a high-quality, 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 concepts 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 with ~10+ papers 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 (35% 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 – specifically runoff-response processes, and flood routing
- Sediment Cascades and Budgets – specifically sediment transport and yield
- Channel Dynamics – stream power, riffle-pool reversals, channel morphology
- Instream Ecology
- New Challenges and Opportunities in Catchment Science
  - Connectivity in Geomorphology
  - Water Balance / Urban Hydrology
  - Addressing Erosion Hazards
  - 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. 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
- Studying/Time Management/Learning Services
- Research Services
- Well-being
W19 Schedule – For reading assignments please go to the appropriate section in CourseLink, for links to PDFs.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Deadlines</th>
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| 1    | - Outline, organization, schedule  
- Expectations (yours and mine)  
- Core themes  
- Group presentation discussions  
- Catchment Processes – Review/Intro | |
|      | **NO LABS WEEK 1** | |
| 2    | - Watershed hydrology  
- Runoff Response, Effective Runoff  
- Hydrographs – separation, storm and unit hydrographs | |
| **Lab 1** | **Infiltration Experiments – Hutt 011** | **Due in 1 week** |
| 3    | - Conclude catchment hydrology  
- Impacts of land use change on the water balance (group discussion)  
- Case study “Water Balance for Urban Landscapes and Wetlands”  
- Sediment transport processes  
- Reach to catchment scale budgeting | **Group Topic Selection** |
| **Lab 2** | **Hydrograph Separation Techniques – Hutt 020** | **Due in 1 week** |
| 4    | - Sediment cascades  
- Headwaters, production zones, transfer zones, deposition zones  
- First Group Presentations (1 day) | |
| **Lab 3** | **Rainfall Intensity & Denudation – Hutt 020** | **Due in 1 week** |
| 5    | - Disrupting sediment transfer processes  
- Case studies  
- First Day of Group Presentations | **Group Presentations and Submission of Group Annotated Presentation** |
| **Lab 4** | **Sediment Transport and Sediment Yield – Hutt 020** | **Due in 1 week** |
| 6    | - Channel morphology  
- Hazards and erosion case study  
- Riffle-pools  
- Second Day of Group Presentations | **Group Presentations and Submission of Group Annotated Presentation** |
|      | **Reading Week – no class or labs -- -- Reading Week** | |
| 7    | - Ecology in flowing streams  
- Habitat  
- Fish passage and spawning  
- Life under ice | |
| **Lab 5** | **Channel Development – Hutt 020** | **Due in 1 week** |
| 8    | - Watercourse restoration and design – introduction  
- Evolution of natural channel design  
- Ecohydrology – Field of Dreams  
- Hydraulic signatures in geomorphic units | |
| 9    | - Where does the water and sediment go? (receiving waterbodies)  
- Case Study | |
| 10   | - And then it all falls apart – Badass Geomorphology  
- Watercourse restoration design  
- Case Study: Invited Lecturer | |
| 11-12 | - Case Study: Invited Lecturer | **Take Home Exam – Submit by 12:00 am on the last day of classes** |

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 3, 2020. 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.