School of Environment, Resources and Sustainability
Faculty of Environment
University of Waterloo

ERS 382: Environmental Monitoring - Spring 2018

Instructor:
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TAs:
TBA

Course Location: Cabot Head Provincial Nature Reserve

Course Dates: The course formally runs the entire spring term – however, the bulk of the course (field skills) occurs during the block period of *August 20th – August 29th, 2018.*

Additional Course Fee: *$468.71 plus 45.57 (HST) = $514.28 Paid to the University.* This fee is in addition to the normal per course fees set by the Province and the University; it pays for all provincial and professionally recognized skills certifications and certificates. This fee covers camping fees, transportation and food for the length of the field portion of the course.

**Please note that normally there will be no refunds of the course fee if a student drops the course. The reason for this is that provincially accredited certifications require a guaranteed number of students present to run, and accommodations are booked well in advance. If extenuating circumstances apply, decisions on refunds will be rendered by the Associate Director of Undergraduate Studies, School of Environment, Resources and Sustainability.

Course Description:
This course is a collaborative effort between the University of Waterloo's School of Environment, Resources and Sustainability and the Niagara Escarpment Commission (NEC), the regulatory agency that administers scenic and natural lands along the Niagara Escarpment geological formation stretching from Niagara Falls in the south to Tobermory in the north. Because its jurisdictional lands (i.e. the Niagara Escarpment Plan Area) are recognized as a UNESCO World Biosphere Reserve, the NEC is required to monitor the health of its lands to ensure that they are maintained in good health. A substantial part of this monitoring is accomplished through the work of the students in this course. Thus, ERS 382 is a field course designed to provide students with the theoretical and practical knowledge of environmental monitoring in the context of the Niagara Escarpment Biosphere Reserve.

[1] *When communicating via email, please identify the course (e.g. "ERS 340") in the subject line. Make sure to use your UW account.*

This course has been previously taught by Dr. Brian Craig. Much of this information and course design is credited to him.

The course consists of three primary components:

1. An overview of the Niagara Escarpment Commission, its mandate, activities, and lands; the international Man and the Biosphere Program and its forest biodiversity monitoring project (tree, shrub/sapling, ground cover and tree health monitoring); biosphere reserves and land use planning and management; and an overview of ecosystem monitoring frameworks, indicators, methods, and community based monitoring. You will be made familiar with recent advances in ecosystem planning, the Ontario's Niagara Escarpment (ONE) Monitoring Program, the ONE Monitoring Framework, and information management and analysis techniques.

2. Hands-on field experience in a complete, comprehensive vegetation monitoring exercise in a permanent one-hectare (100x100 m) plot of native forest as well as an introduction to some other monitoring procedures.

3. Data input using computer software, as well as verification of monitoring information. In addition, there will be opportunities to learn about the ecology and natural history of the Niagara Escarpment and the activities of individuals, organizations, and agencies that contribute to the ecological health of the area.

Course Objectives

1. To provide students with familiarity or understanding of recent advances in ecosystem planning, biosphere reserves, the ONE Monitoring Program, information management and analysis techniques, and communication of monitoring information.

2. Introduce other monitoring programs and techniques operating along the Niagara Escarpment.

3. To give students an opportunity to learn about the conduct of systematic fieldwork through hands-on monitoring experience at the "plot" scale, using protocols developed for monitoring forest biodiversity, as well as other monitoring techniques (e.g. tree health monitoring).

4. To complete the 5-year monitoring review, data collection, data input and mapping, and quality checks for the Cabot Head Provincial Nature Reserve monitoring site.

5. To provide students with the chance to meet professionals engaged in various ways in protecting the natural environment (e.g., ecological and environmental management and administration, policy setting and implementation, scientific research) and learn about how they practice their professions.

6. To provide students with the opportunity to participate in focused lectures and group discussion on environmental monitoring, to evaluate the monitoring activities, generate ideas for further research, and provide an evaluation of the course.

7. To establish a "learning community" that nurtures both individual creativity and mutual assistance, and operates successfully at both the pedagogical and social levels.

8. Completion of an individual report based on course lectures, monitoring literature and issues, and a case study.

9. To provide you with opportunities to experience nature, to sense it in all possible ways, learn to wonder about it, appreciate its beauty, and reflect on our place in the natural world.

10. Have fun working and learning together with colleagues and instructors.

Course Process:

The Province mandates that this course is open during the entire term. However, the major portion of this course will run from *August 20th, 2018 – August 29th, 2018* at Cabot Head Provincial Nature Reserve.

MANDATORY ETHICS TRAINING REQUIRED PRIOR TO THE BEGINNING OF THE COURSE.

Each student must complete the Basic Field and Tissue Course (Theory; AR0009). This will be available on LEARN once you have signed up for the course. Information on the course is available at https://uwaterloo.ca/research/office-research-ethics/research-animals/pre-submission-and-training

Field Work Risk Management Form must be filled out, signed and submitted to the Instructor prior to the first day of the course. This is available at https://uwaterloo.ca/safety-office/sites/ca.safety-office/files/uploads/files/fieldworkriskmanagementform_6.pdf

Required Textbooks:

Shrubs of Ontario - Available as courseware from campus bookstore

Trees of Canada – You can either buy your own copy (a good idea to have a personal copy of this book) or you can sign one out from the Ecology Lab (limited numbers)

Newcomb's Wildflower Guide - You can either buy your own copy (a good idea to have a personal copy of this book) or you can sign one out from the Ecology Lab (limited numbers)

The Forest Biodiversity Monitoring Protocol

We will be using a biodiversity monitoring procedure or "protocol" prepared by the Smithsonian Institution in Washington developed for the International Man and the Biosphere Program (now called the Monitoring and Assessment of Biodiversity Program) sponsored by the United Nations (hence the term SI/MAB protocol). This protocol is designed for establishing permanent one-hectare plots for long-term monitoring of forest biodiversity. The Ecological Monitoring and

Assessment Network (EMAN) of Environment Canada endorsed this protocol as the "national standard" for monitoring forest biodiversity in Canada's temperate forests. Ecological knowledge reveals the importance of biodiversity in maintaining the integrity of natural systems. Thus, it is important to have baseline information on the composition, structure, and function of ecosystems so that the natural state of health of a system is known and thus the effects of perturbations caused by stressors can be understood and appropriate policies implemented for preservation or remediation.

These SI/MAB plots are already showing their usefulness. About 15 years ago a severe ice storm paralyzed eastern Ontario and neighbouring Quebec. The effect on trees and forests was devastating. Fortunately, a SI/MAB plot had been established in the area affected and thus there was a good picture in hand of the characteristics of the pristine mature native forest. Most of the large trees in the experimental plot were brought to the ground by the ice storm and there was little growth intact above a few meters. However, the monitoring in this plot now assumed a unique importance: because of the wealth of data describing the original forest, subsequent monitoring will show how such a forest recovers over time and whether the eventual mature forest at the site will resemble the original forest or evolve into something different. A SI/MAB plot in the Long Point Biosphere Reserve in southern Ontario quantitatively tracked the decline of the Eastern Flowering Dogwood and the information was used in the 2007 COSEWIC assessment and status report:
http://publications.gc.ca/collections/collection_2007/ec/CW69-14-533-2007E.pdf

A common tree species in the five Escarpment plots monitored by this class is white ash. A few years ago, a shipment of goods from China was delivered to Detroit. The goods were packed in wooden crates infested with the larvae of the emerald ash borer beetle. This beetle feeds voraciously on living ash trees and kills the tree within 2 to 4 years. Attempts to contain the infestation to Detroit were unsuccessful and the ash borer is now decimating ash trees in the Great Lakes Forest Region including southern Ontario. It has spread north to Sault Ste. Marie and east to Montreal. http://cfs.nrcan.gc.ca/pages/318. It will be interesting to document the effects of the invasion of the ash borer in the five plots. How will it affect species composition and the overall productivity of the forest?

All the Escarpment plots are recovering from varying degrees of past human disturbance, which is apparent when examining species composition and distribution. However, most the forests contained by the plots are also showing signs of approaching an older growth state, (e.g. based on the presence of shade-tolerant canopy species, trees with relatively large diameters, relatively large stand basal area). To date, the results of data analysis suggest that the Escarpment plots consist of healthy, sugar-maple dominated forests that represent stable cores of the greater forested landscape, with little change in biodiversity between monitoring intervals. With continued protection from human disturbance through the implementation of the policies of the Niagara Escarpment Plan (which includes the requirement to develop park management plans that align with NEP policies and objectives), the sites may eventually provide mature forest conditions not commonly found in southern Ontario.

Tree health is also monitored in a sub-sample of the one-hectare plot using an EMAN-endorsed protocol developed by the Canadian Forest Service (CFS). This data has been collected in the

Escarpment plots since 1999. The addition of this protocol to the ONE Monitoring Program is useful to identify and track possible pest infestations or disease (e.g. butternut canker, beech bark disease) and their impacts on biodiversity. If a notable decline in a species is identified, the CFS can be contacted for further investigation.

There is a growing international program, initiated by the United Nations Educational, Scientific, and Cultural Organization, to protect major representative natural areas as World Biosphere Reserves. The Niagara Escarpment was proclaimed a World Biosphere Reserve more than 20 years ago, and this provides the NEC with an additional compelling reason for setting up a chain of stations or plots for monitoring several pertinent ecological factors. The main reason for establishing monitoring plots along the Niagara Escarpment was to answer the question, "*Is the Niagara Escarpment Plan, with its unique set of environmental land use policies, achieving its goals for the preservation of natural areas under its jurisdiction*"? The Plan implements the NEC *Planning and Development Act (1973)*, which was created "*to provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with the natural environment*."
Your work in this course will not only teach you about environmental monitoring, but you will also make an important contribution to the knowledge base about Escarpment natural areas that will be used and reused for planning decisions in the future.

Through the NEC-UW partnership 5 "control" (undisturbed) SI/MAB plots have been established and are monitored on a 5-year rotational basis at Halton Agreement Forest near Milton (1996, 2001, 2006, 2011), Hockley Valley Provincial Nature Reserve (1997, 2002, 2007, 2012, 2017), Cabot Head Provincial Nature Reserve beside the Bruce Peninsula National Park (1998, 2003, 2008, 2013), the Hope Bay Provincial Nature Reserve (1999, 2004, 2009, 2014) and the Skinner's Bluff Management Area near Wiarton (2000, 2005, 2010, 2015). All of the plots are located within core protected areas of the Biosphere Reserve. The Ecological Monitoring and Assessment Network, which in the past coordinated such monitoring in Canada, periodically evaluated the accuracy of the work done on our plots. They found the work to be exemplary. The Escarpment plots are part of a network of plots in Biosphere Reserves and other protected areas across Canada and worldwide.

Additional Course Information:

Field skills courses are physically demanding and will include long days. We will be going outside in all weather conditions. A few required supplies are listed below:

- Backpack to carry everything in the field
- Water bottle
- Insect repellant/ bug jacket
- Clothing: hat(s), sunglasses (polarized is best for electrofishing), good field clothes (canvass or similar pants with zip off legs are good), clothes that are neutral rather than blue are best (blue

tends to attract insects), long sleeved shirts, rain gear, a good pair of hiking boots with ankle support
• Sunscreen (SPF 30 at least)
• It is a good idea to bring some personal medical supplies (band-aids, polysporin, aloe vera)

**Any student with severe allergies or reactions to certain plant oils, insect stings (etc) need to take precautions ahead of time (e.g. Epipen) and alert TAs and Instructors on the safety form.

Further equipment that is required is listed below. We will discuss it all during our first meeting on Monday, August 13, 2018.

Course Evaluation

Assessment	Percentage of Final Grade
Reading Assignment and Quiz	**10%**
Experiential Learning	**10%**
Participation, Quality of Fieldwork and Data Entry	**35%**
Field Notes	**15%**
Individual Final Assignment	**30%**

Reading Assignment and Quiz (5% of mark)

(Monday, August 13, 2018 @ 10:00 AM: Location TBD)

Prior to the field portion of the course students are review the technical report Monitoring Forest Biodiversity, Health and Dynamics along the Niagara Escarpment Analysis of Results 1996 – 2010 by Anne Marie Laurence, Niagara Escarpment Commission (posted on LEARN), paying particulate attention to geography, geology, tree and shrub species, and monitoring analysis of the Cabot Head monitoring site. Students will be expected to contribute to a discussion of the Cabot Head monitoring site at the pre-trip meeting on Monday, August 13, 2018. There will be a short quiz at the end of the meeting on key themes and ideas presented in the report.

Experiential Learning (15% of mark)

(Due: September, 9th, 2018 at midnight on LEARN)

You will be assessed on your general experience in our learning community, your cooperative performance in the field, your conscientious participation as a member of the field research team, your contribution to maintaining the camp and necessary activities, and any special creative touches or contributions. To assist us in doing this, we ask you to submit 2 short statements. One, no more than one page long (single spaced), should list your contributions to the course. The second, up to two pages (single spaced), should reflect on your learning outcomes. Learning outcomes can be varied, from the methods and techniques you have learned, experiences in the

field, working in teams, coming to appreciate nature, learning to observe, etc. Some students in the past have had quite transformative experiences.

Due date for these 2 short assignments is September, 9th, 2018 at midnight submitted on LEARN.

Participation, Quality of Fieldwork and Data Entry (35% of mark)

On a team/group basis, you will be assessed on the general quality of your fieldwork and data entry. We will expect data to be gathered with reasonable efficiency and team organization; accurate, legible, and neat, per desired formats, and kept in good order. Conduct on the site is also important (e.g., minimizing disturbance to soil vegetation, keeping equipment in good order). Your progress in data inputting and eventual checking of the quality of field data will also be included in this assessment. We also encourage curiosity and good observations: appreciation will be shown for such additional contributions. Naturally, we will make allowance for your need to learn through experience and there will not be unreasonable expectations. Be conscientious and try your best.

Don't be afraid to ask questions. We encourage them. If unsure or confused – ask! Don't be shy: our paramount rule as instructors is that students must always be treated with respect and every question is welcomed without judgment. If you notice something interesting or curious, think about it and mention it to the instructors or your colleagues. Such observations can prove valuable. If you have an idea for improving fieldwork procedures or operations – propose it. Also, take notes and write comments on the data sheets.

Field Notes (15% of mark)

Due Date: August 29th, 2018 by midnight on LEARN or handed in to the instructor after arrival back to the University of Waterloo.

Each student is required to create and maintain a comprehensive set of field notes in addition to data sheets which will be submitted at the end of the field portion of the course. Field notes should include data on weather conditions, geographic locations, dates, environmental data collected and any observation or any ideas that you feel are important. Field Notes will be marked on their comprehensiveness and effectiveness. Notes may be submitted as original handwritten notes, though they can be transcribed by the student to digital format if they are likely to be illegible. It is useful to purchase a good quality field notebook (waterproof paper) with a set of pencils (a normal pen will run if rained on) and a good small sharpener or a set of waterproof pens; it is useful to have a protected clipboard to shield it from rain. In a pinch, a large size Ziploc type freezer bad is useful. It is expected that you will include field notes from the certification courses.

Individual Final Assignment (30% of mark)

Due: by midnight on Sunday, October 14th, 2018 on LEARN

During the course, there will be several lectures including: millennium ecosystem assessment; introduction to monitoring; monitoring frameworks; monitoring indicators; monitoring protocols; and community based monitoring. You will be given the opportunity to undertake an interesting assignment to demonstrate knowledge you have gained on the course. The course instructor will review the assignment expectations towards the end of your course. Use your course notes, bibliography, library resources, scientific journals, Web sites, interviews with experts or practitioners, or your own experience. Make sure to acknowledge your sources of information and assistance; usual UW policy applies. The assignment is due by midnight on Sunday, October 14th, 2018 on LEARN.

Readability and Clarity:

Students are expected to present well organized, and properly written work. Penalties of up to **25%** may be applied in cases where readability and/or clarity are inadequate.

Late Penalties

All assignments, field notes and lab notes are submitted online on LEARN and are due at *midnight* on the date indicated. Students are responsible for handing their work in on time. A late penalty of a 10% deduction (off the final grade of the grade item) is given per calendar day (24 hours) up to three days. Following the third day the assignment will be graded as a zero. Only in unavoidable circumstances will extensions be granted, and must be given by the course instructor prior to the due date of the assignment, field notes, data sheets or quizzes.

Citation Format for Assignments

The citation format adopted for this course is the APA (American Psychological Association) style. The complete style outline can be found in the Publication Manual of the American Psychological Association, located in the reference section in Dana Porter Library, call number BF76.7.P83 1994. Online you can find some quick references at the following URLs.
APA essentials - http://www.vanguard.edu/faculty/ddegelman/index.aspx?doc_id=796 and http://www.apastyle.org/
APA Crib Sheet - http://www.wooster.edu/psychology/apa-crib.html
Citing Electronic References - http://www.apa.org/journals/webref.html#Email
Frequently asked Questions - http://www.apa.org/journals/faq.html

Preparing for the Course

A group tenting sites has been booked at Summer House Park (http://www.summerhousepark.ca) at Miller Lake, Ontario.
For camping we use a combination of tents brought by course members and there may be the opportunity to borrow one from the University. Please let Christine know if you will be able to bring a tent and how many it can accommodate. As you will need space for baggage, a tent listed as “three or four people” will only sleep two (and your gear) comfortably! Also, let Christine know if you plan on sharing a tent with specific course participants. You will need to bring your

own bedding, towels and air mattress and items for your personal needs. Warm clothing, and good boots (waterproof, good ankle support), rainwear (preferably hat, coat, and pants), bug repellent, sunscreen, and a flashlight (and headlamp if possible) are very important. Bring a small backpack and water bottle for our field excursions (it will be a 45 min hike to the field site) and Tupperware/reusable containers to pack your field lunch. There will be opportunities for swimming, so include swimwear. Usually the weather has been good at this location in August, but it can be unpredictable and you should be prepared for adverse conditions. Please be economical with your baggage because space is limited in the vans. If you have any questions, concerns, or needs, please contact Christine (cbarbeau@uwaterloo.ca).

We will rent vans. The minimum age for drivers is 21. There will be three vans and we will need a roster of three volunteer drivers (Christine will also be a driver). The traveling distance from Waterloo to the Primrose Campground is about 228 km (about a 3hr drive). Please let Christine know if you will be available to drive one of the vans.

You are encouraged to bring "extras" to enhance the course: Frisbees and other toys or games, musical instruments and song books, photos or presentations of work or experiences you have had that would interest the other students (e.g., one student had a summer job studying flying squirrels, another had monitored snapping turtles, a third had taken a vacation in Alaska).

Your course fee will provide for about 90% of your food. We will have breakfast in camp and make our own individual lunches from camp provisions, and prepare our evening meals as a group. There will also be ample food for snacking. You are welcome to bring anything special for yourself. One evening meal eaten out will be at your own expense – we will keep costs reasonable. We will maintain a tasty menu and attempt to keep you happy and well fed. Please let Christine know about any special food preferences (e.g., vegetarian, vegan, Kosher, Halal, diabetic) and food allergies, particularly if they are serious such as peanut allergy. We will try to accommodate you as best as possible. It is best to discuss any special preferences or needs with Christine ahead of time. If your case is unusual and difficult to accommodate you may be asked to bring special provisions for yourself (for which you will be reimbursed) to complement what you can eat from the group menu.

Please make sure that you have all your needed prescriptions or medical support with you. Christine will carry a basic first aid kit. Please inform Christine of any special health or medical conditions that he should know about as manager of the course (e,g., chronic fatigue, migraines, acute phobias, anaphylactic reactions, dangerous allergies etc). All such information will be kept strictly confidential. Any student with severe allergies or reactions to certain plant oils, insect stings (etc) need to take precautions ahead of time (e.g. Epipen) and alert TAs and Instructors on the safety form.

If you haven't camped before or spent much time in the field, and aren't feeling sure of things, don't hesitate to ask Christine or a friend who knows about such things. There is a first time for all of us. It is best to plan well ahead rather than try to second-guess what you will need. Please feel free to contact Christine by phone or email.

Agreement on Conduct

The Faculty of Environment field trip guidelines apply. You must sign the agreement before departure.

Useful Web Sites as Developed by Dr. Brian Craig

Look these over – and then do some browsing to find other interesting examples of ecological and environmental monitoring, whether government, corporate, scientific, activist, or individual. Environmental monitoring in the broadest sense means monitoring anything to do with the environment, but lately it usually refers to monitoring physical parameters such as pollutants. Monitoring of vegetation, fauna, ecological function, and species richness is now often called ecological monitoring.

Ecological Monitoring and Assessment Network.
http://www.ec.gc.ca/faunescience-wildlifescience/default.asp?lang=En&n=B0D89DF1-1 Until the program was cancelled in 2010 EMAN helped coordinated ecological monitoring in Canada, particularly monitoring that uses SI/MAB plots as our course does. Take a look at the Terrestrial Vegetation Monitoring Protocols. Also take a look at the other kinds of protocols and see how the principles of monitoring are applied in such contexts.

Niagara Escarpment Commission www.escarpment.org Familiarize yourself with the mandate (i.e. Niagara Escarpment Planning & Development Act and the Niagara Escarpment Plan) and activities of the NEC, and especially the section on Monitoring (the ONE monitoring program) found under the "Education" menu at the top of the web page. Our course should be mentioned there. The NEC holds a biennial conference (the Leading Edge) on all the scientific research occurring on the escarpment. You might be interested in browsing the abstracts (summaries) from the papers presented to familiarize yourself with the wealth of activities and the issues and concerns about the escarpment.

Coalition on the Niagara Escarpment. www.niagaraescarpment.org This is the main citizens group active in protecting the escarpment. Get to know its campaigns and concerns about some of the threats to the escarpment.

UNESCO – World Biosphere Reserves.
www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/ One of the main activities of UNESCO is promoting and coordinating scientific activities at the world level. For instance, the UN has provided the lead in conducting research on climate warming and issuing the most important reports to guide the formulation of vital cooperative agreements such as the Kyoto Accord on climate change. The World Biosphere Reserve program is also one of its initiatives. The website includes the Biosphere Reserve Directory interactive map that lets you visit all the biosphere reserves in the world. Check out the Ontario reserves as well as the more exotic ones world-wide. Also, check out this document produced by UNESCO which includes the history behind the development of the Smithsonian Institute forest biodiversity monitoring protocol: www.unesdoc.unesco.org/images/0009/000938/093876eo.pdf

Canadian Biosphere Reserves Association. http://biospherecanada.ca/ Visit the other

superb natural areas in Canada that have been designated as world biosphere reserves.

Citizens Environment Watch (rebranded to "EcoSpark"). http://www.ecospark.ca/
NGOs and activist groups of all description are now using monitoring as a tool in a wide variety of ways. Here's a good place to see what is happening out there.

Monitoring the Moraine www.monitoringthemoraine.ca This site discusses the monitoring plans now being organized by the very effective citizens group STORM (Save the Oak Ridges Moraine) in collaboration with EcoSpark, as part of its activities to make sure that the recent agreements to protect the moraine are adhered to.

Natural Capital

And finally, a couple good reports on the concept of "natural capital" – all the good things provided by natural areas for the planet as well as human society. Philosophically, we do monitoring to help maintain natural capital, whatever the case. Ducks Unlimited, a long established conservation organization originally financed by very rich US duck and goose hunters has established or rehabilitated many prime wetland areas across North America, has produced a fine document "The Value of Natural Capital in Settled Areas of Canada" which can be found at http://www.ducks.ca/aboutduc/news/archives/pdf/ncapsum.pdf
The David Sudzuki Foundation also produced an interesting document (2008) entitled, "Ontario's wealth, Canada's future – Appreciating the Value of the Greenbelt's Eco-services". The value of the Greenbelt's non-market ecosystems services was estimated to be $2.6 billion per year (approx. $3500 per hectare). This is a conservative estimate due to an incomplete understanding of all benefits provided by nature, intrinsic values and the fact that nature itself is irreplaceable. The Greenbelt's wetlands and forests hold the greatest value, with a combined value of over $2.3 billion. Overall, the highest total values of natural capital within the study area were found along the Niagara Escarpment in the Bruce Peninsula.
http://www.davidsuzuki.org/publications/downloads/2008/DSF-Greenbelt-web.pdf

University of Waterloo Policies and Procedures:

♦ Students with disabilities: AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

♦ Mental Health**:** The University of Waterloo, the Faculty of Environment and our Departments/Schools consider students' well-being to be extremely important. We recognize that throughout the term students may face health challenges - physical and / or emotional. Please note that help is available. Mental health is a serious issue for everyone and can affect your ability to do your best work. Counselling Services https://uwaterloo.ca/counselling-services/ is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more.

♦ Provincial Tests: Students will be expected to follow the rules of the provincial tests. Rules for testing at the University of Waterloo will not apply, nor will accommodations be made during these tests that fall outside the provincial rules.

♦ Religious Observances: Students need to inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

♦ Unclaimed assignments**:** Unclaimed assignments will be retained for one month after term grades become official in quest. After that time, they will be destroyed in compliance with UW's confidential shredding procedures.

♦ Communications with Instructor and Teaching Assistants**:** All communication with students must be through either the student's University of Waterloo email account or via Learn. If a student emails the instructor or TA from a personal account they will be requested to resend the email using their personal University of Waterloo email account.

♦ Intellectual Property: Students should be aware that this course contains the intellectual property of their instructor, TA, and/or the University of Waterloo. Intellectual property includes items such as:

- Lecture content, spoken and written (and any audio/video recording thereof);
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides); Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor, TA or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

♦ Academic Integrity: Each student will be asked to read and sign the Academic Integrity form below. We will go over on the first day of the course: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. The University's guiding principles on academic

integrity can be found here: http://uwaterloo.ca/academicintegrity ENV students are strongly encouraged to review the material provided by the university's Academic Integrity office specifically for students: http://uwaterloo.ca/academicintegrity/Students/index.html
Students are also expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for their actions.

Students who are unsure whether an action constitutes an offense, or who need help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. Students may also complete the following tutorial: https://uwaterloo.ca/library/get-assignment-and-research-help/academic-integrity/academic-integrity-tutorial

When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline: https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-71.
Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance: https://uwaterloo.ca/secretariat-general-counsel/policies-procedures-guidelines/policy-70
Plagiarism: In particular, you should not plagiarize the work of others. Policy 71 defines plagiarism as: "The act of presenting ideas, words or other intellectual property of another as one's own. The use of other people's work must be properly acknowledged in all written material such as…essays, laboratory reports, design projects, statistical data, computer programs and research results. The properly acknowledged use of sources is an accepted and important part of scholarship. Use of such material without complete and unambiguous acknowledgement, however, is an offence under this policy." Students are expected to keep a copy of all materials used to prepare assignments in case of
disputed work and should be able to provide working notes and original data for any assignment within 4 hours of this being requested.

In the context of this course, plagiarism includes (among other activities) submitting without appropriate acknowledgement any report (or part thereof, including software, designs, photos, computer images, models, drawings, maps, statistics, samples, results of lab or field work etc.) which has been submitted previously to any course anywhere by any person, submitting a report in which the production has been shared by more than one student and each has submitted it as their own without acknowledgement of the other's contributions, submitting any work created in whole or in part by another without the usual acknowledgement. Policy 71 states that one should not submit "an essay, report or assignment when a major portion has been previously submitted or is being submitted for another course with the express permission of all the instructors involved". **If in doubt, ask the course instructors or the teaching assistant if your intended assignment submission is acceptable.**
All suspected academic misconduct are investigated and formally reported to the Associate Dean, Undergraduate of Faculty of Environment.

♦ Appeals**:** A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 – (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-72

♦ Grievance**:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. See Policy 70 - Student Petitions and Grievances, Section 4, https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70. When in doubt please contact your Undergraduate Advisor for details. *This form may be used by course instructors as an educational tool to help their students maintain high standards of academic integrity (AI) in their work. Additional copies (as well as a version specifically for programming assignments) are available online at: https://uwaterloo.ca/academic-integrity/sites/ca.academic-integrity/files/uploads/files/AIAcknowledgementForm.pdf.*

Students are expected to know what constitutes AI, to avoid committing AI offences, and to take responsibility for their actions. Students who are unsure whether an action constitutes an offence, or who need help in learning how to avoid offences (e.g., plagiarism, cheating) or about 'rules' for group work / collaboration should seek guidance from the course professor, TA, academic advisor, or the Undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to **Policy 71, *Student Discipline***, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm

A student who believes that he/she has a ground to appeal a discipline decision should refer to **Policy 72, *Student Appeals*,**
http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm
A student who believes that a decision or action of a faculty member has been unfair or unreasonable should refer to **Policy 70, *Student Petitions and Grievances***, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm