APPROACHES TO RESEARCH IN PHYSICAL GEOGRAPHY SPRING 2023

GEOG 294

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CLASS SCHEDULE

Section	Location	Time	Instructor(s)
GEOG 294 001 *[LEC]*	EV3 1408	Mondays & Wednesdays 2:30 p.m. - 3:50 p.m.	Grant Gunn g2gunn@uwaterloo.ca
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INSTRUCTOR / TA INFORMATION

Lab Times: Tuesdays Sec 102: 11:30-01:20, Sec 103: 1:30-3:20 **EV1 134** (Ecology Lab)

Instructor: Dr. Grant Gunn

Office: EV1-232

Office hours: Wednesdays, 10:00am - 11:00am, or by appointment (EV1-307 or via MS Teams). To schedule an appointment outside of these hours, please contact me.

My main research interests aim to improve the retrievals of physical components of the Cryosphere, including permafrost (active layer thickness, timing of thaw/refreeze) and ice parameters in sub-Arctic and Arctic environments. My research applies emerging technologies including: airborne/spaceborne synthetic aperture radar, high-performance cloud computing (ex. Google Earth Engine), interferometry, polarimetric decomposition, thermodynamic modeling, and the collection of field variables to validate these remote observations.

TA: Zeinab Akhavanhameh (zeinab.akhavanhamzeh@uwaterloo.ca)
Office Hours: TBD

COURSE DESCRIPTION

> *Calendar Description for GEOG 294*
>
> Introduces skills for conducting research in physical geography. Selected techniques used in climatology, hydrology, geomorphology and/or biogeography research will be demonstrated and the principles behind the techniques will be explained. Students get hands on experience in research design, field and laboratory techniques, data assembly and the interpretation of data.
>
> Prereq: Level at least 2A Honours Geography and Environmental Management students, Geography and Aviation students and Geomatics students. Antireq: GEOG 394

LEARNING OUTCOMES

By the end of this course students should be able to:

List some of the main methods/techniques used by physical geographers to measure the physical environment
Describe challenges associated with data collection and evaluate accuracy and precision of a range of field techniques and discussion how uncertainty influences interpretation of results
Develop a data management plan and explain the importance of data management within the context of research projects
Effectively find relevant peer-reviewed literature on a chosen topic in physical geography
Critically evaluate scientific literature and provide constructive criticism
Write a research proposal in physical geography including literature review, methods, budget and timeline

TENTATIVE COURSE SCHEDULE

Dates	Topics, Readings	Activities and Deliverables	Meeting activity and peer review
Week 1 M May 8 W May 10	**Topic 0:** Course Introduction <u>Read:</u> Request for proposal assignment **Topic 1:** Scientific approach to geography <u>Read:</u> Chapter 1 – Introduction		M: Introduction to course and each other W: Discussion on philosophy of science
Week 2 M May 15 W May 17	**Topic 2:** Developing research questions <u>Read:</u> Chapter 2 – Fundamental Research Concepts **Topic 3:** Data, metadata and data management plans	<u>Activity:</u> Brainstorm your research question with your group	W: Develop research questions
Week 3 M May 22 (Holiday) T May 23 (go to lab) W May 24	**Topic 4:** What is academic literature?	<u>Activity:</u> **Lab 1** – Measuring precipitation and data management Create your own rain gauges and deploy. Start collecting data. Submit **groupwork contract: F May 26**	M: Literature reviews: let's write W: Library literature searches

Week 4 M May 29 W May 31	**Topic 5:** Literature searches, literature reviews and annotated bibliographies **Topic 6:** Methods in climatology Read: Chapter 5 – Physical measurements	Activity: **Lab 2** – Soil measurements Due **F June 9** submit to Dropbox	M: Focus on meteorology measurements W: Literature reviews: let's improve – Free period to work on literature review
Week 5 M June 5 W June 7	**Topic 7:** Methods in vegetation and soils Read: Chapter 9 – Sampling	BONUS: Vegetation identification and survey activity – IN LAB	M: Focus on soil and vegetation measurements W: Work on lit review and get feedback
Week 6 M June 12 W June 14	**Topic 8:** Methods in hydrology **Topic 9:** Peer-review and critical analysis	Activity: **Lab 3** – Stream gauging and sediment load Due **June 23**, submit to Dropbox	M: Focus on hydrology measurements W: In class time for peer review Upload draft to PeerScholar on **June 20** Submit review by **June 23**
Week 7 M June 19 W June 21	**Topic 10:** Planning research methods Read: Chapter 10 – Statistical data analysis	Activity: **Lab 4** – Microclimates on campus Due **F June 30**, submit to Dropbox Proposal part 1 due **F June 30**, submit to Dropbox	M: Let's design a study – prep for Lab 4 W: Free period
Week 8 M June 26 W June 28	**Topic 10, cont'd:** Planning research methods Read: Chapter 8 – Experimental and Nonexperimental research designs		M: Let's plan research methods W: Free period

Week 9 M July 3 (Holiday) W July 5	**Topic 11:** Fieldwork planning and logistics	<u>Activity:</u> Lab 1 due **F July 7**, submit to Dropbox	M: Free period to work on methods W: In class time for peer review Upload draft to PeerScholar on **T July 4** Submit review by **F July 7**
Week 10 M July 10 W July 12	**Topic 12:** Data display	Proposal part 2 due **F July 14**, submit to Dropbox	M: Effective data display W: Free period
Week 11 M July 17 W July 19	**Topic 13:** Ethics in research <u>Read:</u> Chapter 14 – Ethics in Scientific Research		M: Ethics and diversity in geoscience W: Free period
Week 12 M July 24 W July 26		<u>Activity:</u> Work on final proposal	M/W: Working sessions for final proposal
Week 13 M July 31		Final proposal due on **M July 31** submit to Dropbox	

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
An Introduction to Scientific Research Methods in Geography and Environmental Studies: 2nd Edition. Daniel R. Montello and Paul Sutton, Sage: Washington DC.		Yes
		No

Additional readings will be posted to LEARN as appropriate.

For the lab activities you will need some additional materials to construct rain gauges in Lab 1. Materials for in person labs are provided.

Component	Value
Participation	15%
Labs (3 x 15% each, choose 3 of 4)	45%
Proposal part 1: Literature review, objectives, hypotheses	12%
Proposal part 2: Methods, budget, timeline	12%
Final proposal	16%

Participation grades are based on group work, including labs/group evaluation, peer review activities, and completion of bonus activities.

ASSIGNMENT SCREENING

Text matching software (Turnitin) will be used to screen assignments in this course. This is being done to verify that use of all material and sources in assignments is documented. In the first week of the term, details will be provided about the arrangements for the use of Turnitin and alternatives in this course. See Administrative Policy below for more information and links.

ADMINISTRATIVE POLICY

Intellectual Property: For further information on IP related to teaching, please see https://uwaterloo.ca/legal-and-immigration-services/sites/ca.legal-and-immigration-services/files/uploads/files/volume_1_issue_3_winter_2018.pdf (https://uwaterloo.ca/legal-and-immigration-services/sites/ca.legal-and-immigration-services/files/uploads/files/volume_1_issue_3_winter_2018.pdf) and the Guidelines for Faculty, Staff and Students Entering Relationships with External Organizations Offering Access to Course Materials, https://uwaterloo.ca/secretariat/faculty-staff-and-students-entering-relationships-external (https://uwaterloo.ca/secretariat/faculty-staff-and-students-entering-relationships-external) . The following text is recommended:

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).

Co-op interviews and class attendance: Co-op students are encouraged to try and choose interview time slots that result in the least amount of disruption to class schedules. When this is challenging, or not possible, a student may miss a portion of a class meeting for an interview. Instructors are asked for leniency in these situations; but, a co-op interview does not relieve the student of any requirements associated with that class meeting.

When a co-op interview conflicts with an in-class evaluation mechanism (e.g., test, quiz, presentation, critique), class attendance takes precedence and the onus is on the student to reschedule the interview. CEE provides an interview conflict procedure to manage these situations.

Students will be required to provide copies of their interview schedules (they may be printed from WaterlooWorks) should there be a need to verify class absence due to co-op interviews.

Anti-racism Statement: The University of Waterloo does not tolerate racism or any other form of discrimination and expects campus community members to contribute to a culture where all members feel safe and valued. Any member of the campus community who has experienced racism or discrimination at the University is encouraged to seek guidance from the Office of Equity, Diversity, Inclusion & Anti-racism (EDI-R) via email at equity@uwaterloo.ca (mailto:equity@uwaterloo.ca) or through their website: › uwaterloo.ca/human-rights-equity-inclusion/ about/equity-office3

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/campus-wellness/ (https://uwaterloo.ca/campus-wellness/) 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.

All students are encouraged to download the WatSAFE app which is available free through the google and iOS app stores. The WatSAFE app provides on- and off-campus contacts for students in distress, including international students, and other information related to campus safety and security.

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.

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.

Recording lecture: Use of recording devices during lectures is only allowed with explicit permission of the instructor of the course. If allowed, video recordings may only include images of the instructor and not fellow classmates. Posting

of videos or links to the video to any website, including but not limited to social media sites such as: facebook, twitter, etc., is strictly prohibited.

UNIVERSITY POLICY

Academic integrity: 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. [Check the Office of Academic Integrity (https://uwaterloo.ca/academic-integrity/) for more information.]

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4 (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70) . When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for their actions. [Check the Office of Academic Integrity (https://uwaterloo.ca/academic-integrity/) for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, 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 (https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71) . For typical penalties, check Guidelines for the Assessment of Penalties (https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties) .

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

Note for students with disabilities: AccessAbility Services (https://uwaterloo.ca/disability-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.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit alternate assignment.