HYDROCLIMATOLOGY WINTER 2023

GEOG 209

Published Jan 13, 2023

CLASS SCHEDULE

Section	Location	Time	Instructor(s)
GEOG 209 001 *[LEC]*	EV2 2002	Tuesdays 2:30 p.m. - 4:20 p.m.	Richard Petrone rich.petrone@uwaterloo.ca
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INSTRUCTOR / TA INFORMATION

Dr. Richard Petrone

Office Location: EV1 223

Phone: ext. 39174

Email: rpetrone@uwaterloo.ca (mailto:rpetrone@uwaterloo.ca)

Winter 2023

Lectures: T 2:30 – 4:20 pm

EV2 2002

Office Hours: Tuesday 12:30 – 2:20

Labs: Wednesday 8:30-10:20; Thursday 10:30-12:20; Friday 12:30-2:20

EV2 1001 & EV1 240

Lab Co-ordinator:

Dr. Myroslava Khomik (mkhomik@uwaterloo.ca)

T.A.'s:

TBA

COURSE DESCRIPTION

> *Calendar Description for GEOG 209*
>
> An introduction to the fundamental processes governing climate and hydrological systems and the links between them. It starts with a discussion of basic atmospheric and hydrological processes and traces the flow of energy and water between the earth's surface and the atmosphere. The water cycle is examined including evapotranspiration, precipitation, runoff and water storage in the natural reservoirs (including soil and groundwater, lakes and wetlands).
>
> Prereq: GEOG 102 or EARTH 121

This course provides students with a thorough background of the fundamental processes governing the climate and hydrological systems, and the links between them. The course first reviews fundamental atmospheric and hydrologic processes, and traces the flow of energy and water between the Earth's surface and the atmosphere. Then the physical processes controlling the water cycle are examined, including evapotranspiration, precipitation, runoff and water storage in the natural reservoirs (including soil and groundwater, lakes and wetlands). Finally, students will learn about the roles of water in climate in the Earth's main biomes.

Through the use of group activities students will be given the opportunity to gain experience manipulating real hydrological and meteorological data and instrumentation. This course will serve as an introduction to near-surface hydroclimatic processes, their feedbacks and climate change, forming essential background for upper level courses in climate change, hydroclimatology and environmental sciences and studies in general. The fundamental knowledge and skills developed in this course will provide students with the basis to appreciate and understand the natural hydrologic and climate systems. It also provides the required foundation for advanced courses in climatology and hydrology.

The objective of this course is to provide students with the background to further their interests in weather and climate, and provide the theoretical foundations for upper level science and management courses.

LEARNING OUTCOMES

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

To identify the key boundary layer processes that drive the hydroclimate system.
To gain experience with the tools and methodologies necessary to analyze hydrological, weather and climate information.
Understand the processes controlling the cycling of water between the surface and the atmosphere, and where it is stored in its three phases.
To identify and evaluate the characteristics of different land-use types and ecosystems that drive their hydroclimatic regimes.

TENTATIVE COURSE SCHEDULE

LECTURE TOPICS

1. Introduction to Hydroclimatology

2. Hydrological Cycle, Water Balance Equation

3. Catchment Hydrology

4. Soil Water and Infiltration

5. Precipitation

6. Evapotranspiration

7. Boundary Layer Exchange Processes

8. Climates of Natural Surfaces and Vegetation Effects

9. Floods and Drought

10. Ecology – Hydroclimate Linkages – Water and Carbon Exchange

11. Landuse Change and Hydroclimatic Effects

12. SVAT modelling

COURSE TIMETABLE

The course will be comprised of approximately 12 lectures and 11 tutorials/labs that will be led by the course TAs. Tutorial/lab sessions will run every week according to the following schedule. Tutorial rooms and groups will be determined in the first week of lectures.

Tutorial / Lab Schedule

Jan. 16 Lab #1 – Water Balance & Statistics assignment introduced along with tutorial on spreadsheet use.

Jan. 23 Lab #1 – work on with TA

Jan. 30 Lab #1 – work on with TA

Feb. 6 Lab #2 – Streamflow & Climate assignment introduced & Lab #1 handed in

Feb. 13 Lab #2 – work on with TA

Feb. 27 Lab #2 – work on with TA

March 6 Lab #2 – work on with TA

March 13 Lab #3 – Energy Balance & Evapotranspiration assignment introduced and Lab #2 handed in

March 20 Lab #3 – work on with TA

March 27 Lab #3 – work on with TA

April 3 Lab #3 – work on with TA and hand in Lab #3

TEXTS / MATERIALS

Title / Name	Notes / Comments	Required
"Hydroclimatology: Perspectives and Applications", M.L. Shelton, Cambridge, 2009.	[freely available via UW library website. Hard copies available at UW Bookstore, online retailers and used from various sources.]	No

Additional material for specific topics will be available on reserve in the library.

STUDENT ASSESSMENT

Component	Value
Lab Assignments (25% x 3)	75%
Final Exam	25%

STUDENT RESPONSIBILITIES

1. To attend lectures and go through assigned readings.

2. Term work: To attend and participate in tutorials/lab sessions and complete lab assignments.

3. Final Examination – This will be based on the lectures and any assigned readings. Your final examination will be written during the official exam period at a location determined by the registrar.

ASSIGNMENT SCREENING

No assignment screening will be used in this course.

ADMINISTRATIVE POLICY

LATE SUBMISSION: Failure to submit your work on time will result in a grade of 5% per day beyond the due date for that assignment. Late work will not be accepted under any circumstances without official documentation; for example, a University Illness verification form.

ILLNESS DURING TERM: Please refer to the University of Waterloo Policies regarding documentation and the management of requests for accommodation due to illness during the term. Illness verification forms are required for any student seeking accommodation for any course requirement missed due to an illness. Please refer to http://www.registrar.uwaterloo.ca/students/accom_illness.html for more information.

MISSED FINAL EXAMINATIONS: If the final exam is missed due to illness and all of the proper documentation is submitted on time, either a statistical grade adjustment will be made, or a makeup exam or a deferred final examination (i.e., the next time that this course is taught) will be written.

POLICY ON REGRADING ASSIGNMENTS: If you notice an error in the assessment of your work please follow these steps:

1. Wait 48 hours after the assignment was returned before requesting a regrade
2. All regrade requests must be submitted in hard-copy to the instructor, describing the errors you believe were made. Verbal or emailed requests will not be accepted. Be as specific as possible and list all relevant details, e.g., "my marks were summed incorrectly for questions 1–5".
3. If another student's assignment is used as an example or reason for an error in grading, both assignments must be submitted for a regrade.
4. The entire assignment will be regraded, not the just the errors indicated in the written request. The resulting grade may increase or decrease depending on the result of the regrading.

POLICY ON EMAIL CORRESPONDENCE: Students are encouraged to attend office hours to discuss any issues relating to the course. On the other hand, students should rarely need to send email to the instructor or TA because most information required is available elsewhere: e.g., in this course outline, on UW LEARN, on the Discussion boards, in the textbook, after class, or at office hours. However, if your question or concern cannot wait until the next lecture then please remember these policies when sending email:

- Always send emails from your University of Waterloo email account.
- All emails should have the following subject line: "GEOG209: <<insert your message here>>"
- If your email includes an attachment, describe the contents of the attachment in the email. Be polite, respectful and professional.
- Proofread your email and use correct grammar and punctuation.
- Always use an appropriate greeting, and sign your full name.
- Allow the instructor or TA at least two business days to respond before sending the request again. Mark all urgent matters "URGENT" in the subject line.
- The instructor or TA reserves the right to reply to you along with the entire class if the question is deemed to be relevant to other students on the course.

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.