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## ENVS\*3050 - Microclimatology

### Winter 2024 Course Outline

Section: 01

Credits: 0.50

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## Land Acknowledgement: Guelph

The University of Guelph resides on the ancestral lands of the Attawandaron people and the treaty lands and territory of the Mississaugas of the Credit. We recognize the significance of the Dish with One Spoon Covenant to this land and offer respect to our Anishinaabe, Haudenosaunee and Métis neighbours. Today, this gathering place is home to many First Nations, Inuit, and Métis peoples and acknowledging them reminds us of our important connection to this land where we work and learn.

## Calendar Description

This course examines natural and intentionally-modified microclimates near the earth's surface; energy budgets; transport of mass and heat. Familiarization with some instruments for microclimatic measurements will be required.

**Prerequisite(s):** ENVS\*2030

**Department(s):** School of Environmental Sciences

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## Course Fit Within Program/Curriculum

ENVS2030 **Meteorology and Climatology** is a pre-requisite for this course. When you complete ENVS3050 you will be able to take ENVS\*4050 **Predicting Impacts of Environmental Change** and/or ENVS\*4210 **Meteorological and Environmental Instrumentation**.

## Lecture Schedule

MonWedFri 9:30am-10:20am in MCKN\*236 (1/8 to 4/23)

## Instructor Information

Claudia Wagner-Riddle, Prof.

Email: cwagnerr@uoguelph.ca

Office: Alexander Hall room 110

Winter 2024 Office Hours:

Mon and Wed 10:30-11:30 am, or by appointment (contact via email to book a time). You can also try Office 365 'Teams' at any time. Note that I will make every effort to reply promptly but please allow for a 48 h period by which you will receive a response.

Office Phone: 52787

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## Additional Support

**Teaching Assistant:** Elided Junior Lumor

**TA email:** elumor@uoguelph.ca

**Office location and office hours:** Alexander Hall room 110; office hours will be announced on Courselink or by appointment (contact via email to book a time).

## Textbooks

Group	Title	Author	ISBN
Recommended	Boundary layer climates	T.R. Oke	978-0415043199

## Learning Resources

### Required Resources

All lecture slides, course handouts, review/discussion questions, assignments, etc. will be posted on Course link (Website) (<https://courselink.uoguelph.ca/>) as we progress through the course topics. A set of incomplete lecture slides will be posted on the day of each lecture and these will be updated shortly after the lecture to include all slides shown in class. Please bring your calculator to class as we will work on example problems in each class. You will also need to use Excel spreadsheets for assignments.

### Campus Resources

If you are concerned about any aspect of your academic program: Make an appointment with a Program Counsellor (<https://www.uoguelph.ca/uaic/programcounsellors/>) in your degree program. If you are struggling to succeed academically: There are numerous academic resources offered by the Learning Commons (<https://www.lib.uoguelph.ca/using-library/spaces/learning-commons/>) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills.

### Library Course Reserve (Ares)

For this course, you will be required to access course reserve materials through the University of Guelph McLaughlin Library. To access these items, select **Ares** on the navbar in CourseLink. Note that you will need your Central Login ID and password in order to access items on reserve.

For further instructions on accessing reserve resources, visit [How to Get Course Reserve Materials \(https://lib.uoguelph.ca/find/course-reserves-ares/how-get-course-reserve-material/\)](https://lib.uoguelph.ca/find/course-reserves-ares/how-get-course-reserve-material/).

If at any point during the course you have difficulty accessing reserve materials, please contact the e-Learning Operations and Reserve Services staff at:

Tel: 519-824-4120 ext. 53621 | Email: [libres2@uoguelph.ca](mailto:libres2@uoguelph.ca) | Location: McLaughlin Library, First Floor, University of Guelph

### Course Level Learning Outcomes

At the end of this course, you will be able to...

1. Identify and describe basic principles (e.g., energy budget and Ohm's law analogy) underlying mass and energy exchange in the environment;
2. Apply and interpret these principles to specific microclimates (e.g., non-vegetated, vegetated surfaces);
3. Apply microclimatic principles to broad environmental issues (e.g., climate change);
4. Solve, interpret and communicate results of simple numerical models of microclimates;
5. Use simple microclimatic instruments to characterize contrasting microclimates and relate results to microclimatic principles.

### Schedule of Topics and Assignments

Week of	Topic	Activities	Due:
1/8	Introduction: scales in Microclimatology. Fundamental concepts: modes of energy transfer. Review of radiation laws, and radiative properties of materials.	Lectures 1 to 3 Readings: Chapter/Section: 1/1,3a; 2/1a Pages: 3-6, 8-17; 33-34	N/A
1/15	Radiation, energy and mass balance; consumer vs. supplier and sign convention.	Lectures 4 to 6 Readings: Chapter/Section: 1/2,3c, 4 Pages: 7, 20-32	N/A
1/22	Profiles of temperature, and gases: spatial and temporal variability. Ohm's law analogy. Computer model for surface temperature: development and testing.	Lectures 7 to 9 Readings: Chapter/Section: 2/1c, 3e Pages: 37-41, 69-71	Assignment 1 due Jan 26

1/29	Wind speed profile and aerodynamic resistance; atmospheric surface layer: turbulence and sensible heat, latent heat and momentum flux; stability effects.	Lectures 10 to 12 Readings: Chapter/Section: 2/3a, 3b, 3c, 3d Pages: 51-76	Assignment 2 due Feb 2
2/5	Review.	N/A	Mid-term test 1, Feb 9
2/12	Sub-surface climates: heat storage in the soil. Computer model: soil temperature wave	Lectures 13 to 15 Readings: Chapter/Section: 2/1b, 2a Pages: 34-36, 46-48	N/A
2/19		Winter Break	
2/21		Winter Break	
2/23		Winter Break	
2/26	Microclimates of simple non-vegetated surfaces: snow.	Lectures 16 to 18 Readings: Chapter/Section: 3/2a,2b,2c Pages: 84-98	Assignment 3 due Mar 1
3/4	Microclimates of simple non-vegetated surfaces: water.	Lectures 19 to 21 Readings: Chapter/Section: 3/3a,3b,3c Pages: 98-107	Assignment 4 due Mar 8
3/11	Microclimates of vegetated surfaces: crops and forests. Ecosystem-atmosphere carbon exchange.	Lectures 22 to 24 Readings: Chapter: 4 Pages: 110-158	Assignment 5 due Mar 15
3/18	Review.	N/A	Mid-term test 2 on Mar 22
3/25	Climates of Animals.	Lectures 25 to 27 Readings: Chapter: 6 Pages: 190-197, 206-226	N/A
3/29		Holiday - Classes Rescheduled to Monday April 8	
4/1	Human Comfort. Wind Chill Temperature.	Lectures 28 to 30 Reading: Handout	N/A
4/8	Review.	Lecture 31	Final Exam on Apr 13

## Assessment Breakdown

Description	Weighting (%)	Due Date
Assignment 1	5%	Week 3 (Jan 26)
Assignment 2	5%	Week 4 (Feb 2)
Mid-term test 1	15%	Week 5 (Feb 9)
Assignment 3	5%	Week 7 (Mar 1)
Assignment 4	5%	Week 8 (Mar 8)
Assignment 5	5%	Week 9 (Mar 15)
Mid-term test 2	15%	Week 10 (Mar 22)
Group project presentation	10%	TBA
Final Exam	35%	Week 12 (Apr 13)

## Final Exam

Date: Apr 13

Time: Sa 8:30am-10:30am

Location: TBA *Please see Web Advisor closer to the date of scheduled final for location.*

To understand rules and regulations regarding Examinations students are encouraged to read Student's Responsibilities (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/examinations/>)

If the student is unable to meet the final exam requirements due to medical, psychological or compassionate circumstances they are encouraged to review Student's Responsibilities in the Academic Consideration, Appeals and Petitions (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>) section of the Academic Calendar.

## Last Day to Drop Course

The final day to drop Winter 2024 courses without academic penalty is the last day of classes: April 08

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

## Course Grading Policies

### Submission of Assignments

Assignments are to be handed in class on the stipulated deadline.

### Late Assignment

No late submissions will be accepted without medical or compassionate documentation.

## Course Standard Statements

### Course Policies

The microclimate measurement project and presentation are to be completed by all group members. Assignments must be completed individually.

## Standard Statements for Undergraduate Courses

### Academic Integrity

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 (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/>) is outlined in the Undergraduate Calendar.

### Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas/>)

## Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodations of Religious Obligations (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-accommodation-religious-obligations/>).

## 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.

## Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all undergraduate students except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in the Undergraduate Calendar - Dropping Courses (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/>).

## Email 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.

## Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources (<https://wellness.uoguelph.ca/shine-this-year/>). The Student Wellness team are here to help and welcome the opportunity to connect with you.

## Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

## Recording of Materials

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

## 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. (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>)