1 Course Details

1.1 Calendar Description

This course is focused on the effects of urbanization and pollutant and greenhouse gas emissions on local, regional and global climates and the subsequent impacts on human life. Students will develop and apply simple numerical models of atmospheric processes toward solving practical problems, including applications related to land-atmosphere exchange of heat and water, air quality, and assessment of thermal comfort in urban environments. Students will learn tools for analysis of global climate model data, preparing them to work directly with the data underlying projected future climates.

Pre-Requisites: ENVS*3050

1.2 Course Description

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1.3 Timetable

Lecture: **Wed, 8:30 am - 11:20 am; Zoom** (Access Through CourseLink); ROZH 107 (if/when we return to in person instruction)

1.4 Final Exam

April 25, 8:30am - 10:30am. Final exam timing may be changed to another date and time that is agreed on by the instructor and all students.
2 Instructional Support

2.1 Instructional Support Team

Instructor: Scott Krayenhoff  
Email: skrayenh@uoguelph.ca  
Telephone: +1-519-824-4120 x56868  
Office: ALEX 108  
Office Hours: By appointment (email Scott).

2.2 Communicating with the instructor

During the course, the instructor will interact with you on various course matters using the following means of communication:

Announcements: The instructor will use Announcements on the course website homepage (on CourseLink) to provide you with course reminders and updates. Please check this section frequently for course updates from your instructors.

Class time: You will have access to the instructor for 3 hours each week, i.e., 3 hours of lecture and discussion time. The best time to interact with the instructor is therefore during that time, especially for asking questions related to the lab assignments.

Email: If you have a conflict that prevents you from completing course requirements, or have a question concerning a personal matter, you can send the instructor a private message by email. The instructor will attempt to respond to your email within 48 hours (weekends and holidays excepted).

Video Call: This option for communication is available during online learning when no in-person class activities are taking place. During online-only teaching, if you have a complex question you would like to discuss with the instructor, you may book a video meeting on Microsoft Teams. Video meetings will depend on the availability of the instructor. If you require a video meeting, email the instructor.

*Please note that neither emails nor video calls should be used in lieu of attending lectures.

3 Learning Resources

3.1 Required Resources

An ebook is available through the University of Guelph Library.

Course Technologies and Technical Support (Software)

CourseLink: The course website is available via CourseLink. CourseLink (powered by D2L's
Brightspace) is the University of Guelph’s online learning management system (LMS). By using this service, you agree to comply with the University of Guelph’s Access and Privacy Guidelines. Please visit the D2L website to review the Brightspace privacy statement and Brightspace Learning Environment web accessibility standards. http://www.uoguelph.ca/web/privacy/ https://www.d2l.com/legal/privacy/ https://www.d2l.com/accessibility/standards/ You are responsible for ensuring that your computer system meets the necessary CourseLink system requirements. Use the browser check tool to ensure your browser settings are compatible and up to date (see links below).
http://spaces.uoguelph.ca/ed/system-requirements/
https://courseslink.uoguelph.ca/d2l/systemCheck If you need any assistance with the software tools or the CourseLink website, contact CourseLink Support. Email: courselink@uoguelph.ca Phone: 519-824-4120 ext. 56939 Toll-Free (CAN/USA): 1-866-275-1478 Support Hours (Eastern Time): Monday-Friday: 8:30 am–8:30 pm Saturday: 10:00 am–4:00 pm Sunday: 12:00 pm–6:00 pm

Zoom: Until in-person class activities resume, this course will use Zoom for synchronous lectures. Check your system requirements to ensure you will be able to participate. https://opened.uoguelph.ca/student-resources/system-and-software-requirements Direct links to the Zoom virtual classroom will be posted on CourseLink (under Content -> Modules -> Zoom).

3.2 Recommended Resources

An ebook is available through the University of Guelph Library.

An ebook is available through the University of Guelph Library.

3.3 Additional Resources

Lecture Notes and Library Access (Readings)
Partial lecture slide decks (i.e., handouts in PDF format) will be posted on CourseLink, typically ahead of class activities. Students will be expected to take personal notes, as needed, about additional materials not included in the handouts. The instructor will provide links to interesting instructional videos, tutorials, websites and/or phone applications when appropriate. Google can also be a useful resource for this course. As a student, you have access to the University of Guelph’s library collection, including both physical and electronic materials. For information on checking out library items, accessing electronic journals and returning items to the library, visit the library website. If you are studying off-campus and would like to access the library’s electronic resources, use the Off-Campus Login option and log in, either by using your Single Sign-On credentials or by using your last name and library barcode.

https://www.lib.uoguelph.ca/
4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:
1. Describe the basic mechanisms underlying mass and energy exchange between land and atmosphere and assess their modification in urban environments
2. Describe basic physical and chemical processes associated with regional air quality and global climate change
3. Implement several energy exchange mechanisms in a numerical model using discretization and related modelling principles
4. Create simulations, perform sensitivity analyses, and correctly interpret simulation results
5. Analyze multi-variable, multi-dimensional datasets
6. Communicate results graphically, in writing, and orally, meeting appropriate scientific standards

5 Teaching and Learning Activities

5.1 Lecture

Topics: The schedule below is tentative, and will be adjusted through the term as needed.

Jan. 12: Intro to course; Historical impacts of humans on environments; Introduction to urban climate

Jan. 19: Urban climate concepts; Surface energy balance; Methods of investigation, incl. numerical modelling; Urban airflow

Jan. 26: Urban radiation, energy balance and urban heat islands
Feb. 2: Urban water balance; Climate sensitive design

Feb. 9: Climates of humans; Geographical controls; Precipitation

Feb. 16: Midterm

Feb. 23: No class (winter break).

Mar. 2: Urban air pollution

Mar. 9: Meteorology for air quality

Mar. 16: Air dispersion modelling

Mar. 23: Land cover change, urban development, and global climate change

Mar. 30: General circulation modelling; Climate and life

Apr. 6: Aerosols, mitigation/adaptation

5.2 Assignments

The schedule below is tentative; it may be adjusted through the term as needed.

Jan. 19: Assignment #1 - *Urban climate modelling* (due on Feb. 2)

Feb. 9: Assignment #2 - *Thermal comfort modelling* (due on Mar. 2)

Mar. 9: Assignment #3 - *Air quality modelling* (due on Mar. 23)

Mar. 23: Assignment #4 - *Analysis of climate change projections* (presentation on Apr. 6; report due on Apr. 13)
6 Assessments

6.1 Marking Schemes & Distributions

<table>
<thead>
<tr>
<th>Assessment Type (Matching Learning Outcome)</th>
<th>Weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment #1 (1, 3, 4, 6)</td>
<td>15</td>
</tr>
<tr>
<td>Assignment #2 (1, 4, 6)</td>
<td>15</td>
</tr>
<tr>
<td>Assignment #3 (2, 4, 6)</td>
<td>15</td>
</tr>
<tr>
<td>Assignment #4, including oral presentation (2, 5, 6)</td>
<td>20</td>
</tr>
<tr>
<td>Midterm exam (1)</td>
<td>10</td>
</tr>
<tr>
<td>Final exam (1, 2)</td>
<td>20</td>
</tr>
<tr>
<td>Class participation</td>
<td>5</td>
</tr>
</tbody>
</table>

6.2 Dropbox Submissions

All assignments should be submitted electronically via the online Dropbox tool available from CourseLink. When submitting your assignments using the Dropbox tool, do not leave the page until your work has successfully uploaded. To verify that your submission was complete, you can view the submission history immediately after the upload to see which files uploaded successfully. The system will also email you a receipt. Save this email receipt as proof of submission. Handwritten or typed submissions (or combinations of both) are acceptable.

If, for some reason, you have a technical difficulty when submitting your work electronically, please contact an instructor or CourseLink Support. http://spaces.uoguelph.ca/ed/contact-us/

6.3 Grades and Feedback

The instructor will attempt to have assessment feedback posted online within 2 weeks of each submission deadline. The instructor will review your assignments and return, to you, an annotated version of the file that you originally submitted. Your grade will therefore be written directly on the annotated version of your submitted file. Please note that your grades for individual assessments may not be entered in the Grades tool of the course website. At the end of the term and after the final exam period has ended, as a University of Guelph student, you will be able to access your final course grade by logging into WebAdvisor (using your U of G central ID). https://webadvisor.uoguelph.ca

7 University Statements

7.1 Email Communication
As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

7.2 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. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals  
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration  
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions  
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

7.3 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 students (undergraduate, graduate and diploma) 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 their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses  
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes  
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-chg.shtml

Associate Diploma Calendar - Dropping Courses  
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

7.4 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.

7.5 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 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website https://www.ridgetownc.com/services/accessibilityservices.cfm

7.6 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 encourages academic integrity. 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.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

7.7 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.
7.8 Resources

The Academic Calendars are the source of information about the University of Guelph’s procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

7.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

7.10 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).

7.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.