1 Course Details

1.1 Calendar Description

This course examines solar and terrestrial radiation; pressure systems and winds; atmospheric stability and vertical motions; air masses and fronts; clouds and precipitation; selected topics in applied meteorology including air pollution. The laboratory emphasizes the analysis and use of atmospheric data for solving environmental problems.

Pre-Requisites: 1 of IPS*1500, MATH*1080, MATH*1200, PHYS*1070, PHYS*1080, PHYS*1130, PHYS*1300

1.2 Course Description

This course examines solar and terrestrial radiation; pressure systems and winds; atmospheric stability and vertical motions; air masses and fronts; clouds and precipitation; tropical weather systems: air pollution and climate change.

1.3 Timetable

Timetable is subject to change. Please see WebAdvisor for the latest information.

Class Schedule and Location:

Lectures: MWF 10:30-11:20am (AD-S, Room Virtual)
Lab section 1: Th 3:30-5:20pm (AD-S, Room Virtual)
Lab section 2: W 3:30-5:20pm (AD-S, Room Virtual)
Lab section 3: M 2:30-4:20pm (AD-S, Room Virtual)
1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

Dec 12 (2:30-4:30 pm), Room TBA.

2 Instructional Support

2.1 Instructional Support Team

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Claudia Wagner-Riddle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td><a href="mailto:cwagnerr@uoguelph.ca">cwagnerr@uoguelph.ca</a></td>
</tr>
<tr>
<td>Telephone</td>
<td>+1-519-824-4120 x52787</td>
</tr>
<tr>
<td>Office</td>
<td>ALEX 110</td>
</tr>
<tr>
<td>Office Hours</td>
<td>MWF 11:30—12:20 (on Microsoft Teams)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Scott Krayenhoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td><a href="mailto:skrayenh@uoguelph.ca">skrayenh@uoguelph.ca</a></td>
</tr>
<tr>
<td>Telephone</td>
<td>+1-519-824-4120 x56868</td>
</tr>
<tr>
<td>Office</td>
<td>ALEX 108</td>
</tr>
<tr>
<td>Office Hours</td>
<td>MW 11:30—12:20; F 15:00-16:00 (on Microsoft Teams)</td>
</tr>
</tbody>
</table>

2.2 Communicating with the Instructional Team

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

**Announcements:** The instructors 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:** With synchronous activities being planned for this course, you will have full access to each instructor for 3 hours of lecture each week, and up to 2 hours of lab every second week. The best time to interact with the instructor is therefore during that time.

**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 appropriate instructor (see applicable weeks below in Sect. 5) a private message by email. The instructor will attempt to respond to your email within 48 hours (weekends and holidays excepted).

**Video Call:** If you have a complex question you would like to discuss with an instructor, you may book a video meeting on Microsoft Teams. Video meetings will depend on the availability of the instructor and will be booked on a first come first served basis. If you require a video meeting, email the appropriate instructor (see applicable weeks below in Sect. 5).
Please note that neither emails nor video calls should be used in lieu of attending synchronous class activities.

3 Learning Resources

3.1 Required Resources

Course Technologies and Technical Support (Software) (Software)

System and Software Requirements

This course will use a variety of technologies including:

- CourseLink (main classroom)
- Zoom
- Teams (via Office 365)

To help ensure you have the best learning experience possible, please review the list of system and software requirements.
https://opened.uoguelph.ca/student-resources/system-and-software-requirements

CourseLink System Requirements
You are responsible for ensuring that your computer system meets the necessary system requirements. Use the browser check tool to ensure your browser settings are compatible and up to date. (Results will be displayed in a new browser window).
http://spaces.uoguelph.ca/ed/system-requirements/
https://courselink.uoguelph.ca/d2l/systemCheck

Course Technologies

CourseLink
This course is being offered using CourseLink (powered by D2L's Brightspace), 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/

Technical Support
If you need any assistance with the software tools or the CourseLink website, contact CourseLink Support.
Email: courselink@uoguelph.ca
Zoom
This course will use Zoom for lectures and labs. 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 --> Link To On-Line Classes --> Zoom). Recordings of lectures will also be made available on CourseLink.

Teams (via Office 365)
Office 365 Teams is a collaboration service that provides shared conversation spaces to help teams coordinate and communicate information. This course will use Teams for one on one meetings with your Instructor. It is recommended that you use the desktop version of Teams. As a student you are responsible for learning how to use Teams and its features. For Teams Support visit the CCS website for more information.
https://www.uoguelph.ca/ccs/services/office365/teams

Technical Skills
As part of your learning experience, you are expected to use a variety of technologies for assignments, lectures, teamwork, and meetings. In order to be successful in this course you will need to have the following technical skills:

- Manage files and folders on your computer (e.g., save, name, copy, backup, rename, delete, and check properties);
- Install software, security, and virus protection;
- Use office applications (e.g., Word, PowerPoint, Excel, or similar) to create documents;
- Be comfortable uploading and downloading saved files;
- Communicate using email (e.g., create, receive, reply, print, send, download, and open attachments);
- Navigate the CourseLink learning environment and use the essential tools, such as Dropbox, Quizzes, Discussions, and Grades (the instructions for this are given in your course);
- Access, navigate, and search the Internet using a web browser (e.g., Firefox, Internet Explorer); and
- Perform online research using various search engines (e.g., Google) and library databases.

Use online support resources (e.g., Google) if you need support with any of the above.
3.2 Recommended Resources


3.3 Netiquette expectations

The course website and Zoom room are considered the classroom. The same protections, expectations, guidelines, and regulations used in face-to-face settings apply to the virtual classroom. Inappropriate behaviour will not be tolerated. Examples of inappropriate online behaviour include:

- Posting inflammatory messages about the instructor or fellow students;
- Using offensive language;
- Copying or presenting someone else's work as your own;
- Buying or selling term papers or assignments;
- Posting or selling course materials to course notes websites;
- Having someone else complete your quiz or completing a quiz for/with another student;
- Stating false claims about lost quiz answers or other assignment submissions;
- Threatening or harassing a student or instructor;
- Discriminating against fellow students, instructors, and/or TAs;
- Using the course website to promote profit-driven products or services;
- Attempting to compromise the security or functionality of the learning management system; and
- Sharing your username and password

4 Learning Outcomes

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

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Identify weather instruments and state how they are placed in a weather station;
2. Use laws of radiation to explain radiation transfer in the environment and solve problems related to radiation budgets;
3. Apply the energy budget concept to explain the Earth's climate at the surface and human thermal comfort;
4. Describe, use and convert measures that quantify atmospheric water vapour;
5. Predict the formation of clouds and rain using atmospheric sounding data and a skew-T
6. Describe the Bergeron process for formation of precipitation using the concept of vapour pressure over water and ice;
7. Predict wind speed and direction from isobars and isoheights using a force-body diagram;
8. Access public data on weather and climate, including historical records, current and forecast conditions;
9. Interpret surface and upper air weather maps, including all basic symbols, and use this to state current weather conditions at any point;
10. Use the Norwegian cyclone model and the concepts of air masses and fronts to produce a short-range forecast from a map of current conditions;
11. Use the Hadley cell model, trade winds and the ITCZ to explain precipitation patterns in the tropics;
12. Apply simple models to predict the dispersion of air pollutants;
13. Explain uncertainties in climate change predictions using the concepts of positive and negative feedback in the climate system.

5 Teaching and Learning Activities

5.1 Lecture

Week of Sep 7
Topics: Introduction
Instructor: C. Wagner-Riddle

Week of Sep 14
Topics: Radiation
Instructor: C. Wagner-Riddle

Week of Sep 21
Topics: Radiation
Instructor: C. Wagner-Riddle

Week of Sep 28
Topics: Water in the Atmosphere
Instructor: C. Wagner-Riddle

Week of Oct 5
Topics: Stability and Clouds
Instructor: S. Krayenhoff

Week of Oct 12
Topics: Precipitation Processes
Instructor: S. Krayenhoff
Week of Oct 19  
Topics: Atmospheric Motions  
Instructor: S. Krayenhoff

Week of Oct 26  
Topics: Atmospheric Motions  
Instructor: S. Krayenhoff

Week of Nov 2  
Topics: Air Masses and Fronts  
Instructor: S. Krayenhoff

Week of Nov 9  
Topics: Air Masses and Fronts  
Instructor: S. Krayenhoff

Week of Nov 16  
Topics: Tropical Weather Systems  
Instructor: C. Wagner-Riddle

Week of Nov 23  
Topics: Air Quality  
Instructor: C. Wagner-Riddle

Week of Nov 30  
Topics: Climate Change  
Instructor: C. Wagner-Riddle

5.2 Lab

Week of Sep 7  
Topics: No lab

Week of Sep 14  
Topics: No lab

Week of Sep 21  
Topics: Radiation  
Instructor: C. Wagner-Riddle

Week of Sep 28  
Topics: No lab

Week of Oct 5  
Topics: Climate and Comfort  
Instructor: C. Wagner-Riddle

Week of Oct 12  
Topics: No lab

Week of Oct 19
Topics: Stability
Instructor: S. Krayenhoff

Week of Oct 26
Topics: No lab

Week of Nov 2
Topics: Wind and Maps
Instructor: S. Krayenhoff

Week of Nov 9
Topics: No Lab

Week of Nov 16
Topics: Fronts and Forecasting
Instructor: S. Krayenhoff

Week of Nov 23
Topics: Air Quality (Thurs. lab)
Instructor: C. Wagner-Riddle

Week of Nov 30
Topics: Air Quality (Mon, Wed. labs)
Instructor: C. Wagner-Riddle

5.3 Labs:
Lab assignments will be posted on CourseLink. The schedule above is tentative; it may be adjusted through the term as needed.

Note 1: Please note that it is during lab sessions that you will be able to get the most help from the instructional team. It is not guaranteed that the instructors will be available outside of those periods to help. It is also strongly recommended that you use the lab sessions to complete as much of the lab exercises as possible, as this will mean that you have less to do on your own when you leave the classroom.

Note 2: Lab assignments are due on the dates indicated below (Sect. 6.2) by 11:59pm (i.e., Monday at 11:59 pm or earlier). Labs are to be submitted to Dropbox unless otherwise directed by the instructors (see Sect. 6.4 below).

6 Assessments
Your performance in the course will be evaluated through two Mid-term Exams, Lab Exercises and the Final Exam. The Mid-Term Exams will have an in-class part (worth 15% of the total mark) and a take-home part (to be completed individually, worth 5%).

6.1 Marking Schemes & Distributions

<table>
<thead>
<tr>
<th>Name</th>
<th>Scheme A (%)</th>
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</tr>
<tr>
<td>Lab Exercise on Human Comfort*</td>
<td>4</td>
</tr>
<tr>
<td>Lab Exercise on Stability*</td>
<td>4</td>
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<tr>
<td>Lab Exercise on Wind and Maps*</td>
<td>4</td>
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<tr>
<td>Lab Exercise on Fronts and Forecasting*</td>
<td>4</td>
</tr>
<tr>
<td>Lab Exercise on Air Pollution*</td>
<td>4</td>
</tr>
<tr>
<td>Mid-Term Exam 1</td>
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<tr>
<td>Mid-Term Exam 2</td>
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<tr>
<td>Final Exam</td>
<td>40</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>104</strong></td>
</tr>
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</table>

6.2 Assessment Details

**Lab Assignment 1 on Radiation* (4%)**
Date: Mon, Sep 28, Submit online (see Sect. 6.4)

**Lab Assignment 2 on Human Comfort* (4%)**
Date: Mon, Oct 12, Submit online (see Sect. 6.4)

**Lab Assignment 3 on Stability* (4%)**
Date: Mon, Oct 26, Submit online (see Sect. 6.4)

**Lab Assignment 4 on Wind and Maps* (4%)**
Date: Mon, Nov 9, Submit online (see Sect. 6.4)

**Lab Assignment 5 on Fronts and Forecasting* (4%)**
Date: Mon, Nov 23, Submit online (see Sect. 6.4)

**Lab Assignment 6 on Air Pollution* (4%)**
Date: Submit online (see Sect. 6.4)
Due Nov 30 for Thurs lab
Due Dec 3 for Tues and Wed labs

**Mid-Term Exam 1 (20%)**
Date: Week 6
Oct 16 (in-class part, 15%); Oct 19 (take-home part, 5%)
Mid-Term Exam 2 (20%)
   Date: Week 11
   Nov 20 (in-class part, 15%); Nov 23 (take-home part, 5%)

Final Exam (40%)
   Date: Sat, Dec 12, 2:30 PM - , 4:30 PM
   Scheduled by Registrar - Room TBA.

6.3 Lab Marks*
   *the lowest lab mark will be dropped (i.e. only 5 out of 6 labs will be considered in the final mark)

6.4 Dropbox Submissions
   All lab assignments should be submitted electronically via the online Dropbox tool available from CourseLink, unless otherwise indicated by the instructors. When submitting your assignments or reports 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. If, for some reason, you have a technical difficulty when submitting your work electronically, please contact CourseLink Support.

   http://spaces.uoguelph.ca/ed/contact-us/

6.5 Grades and feedback
   Unofficial assessment marks will be available in the Grades tool of the course website. The instructors will attempt to have assessment marks posted online within 2 weeks of the submission deadline, if the assignment was submitted on time. Once your assignments are marked, you can view your individual marks on the course website by selecting Grades from the Tools dropdown menu on the navbar. The course website will remain open to you for seven days following the last day of the final exam period. 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 Course Statements

7.1 Grading Policies
   Lab assignments are to be submitted to the instructors, via CourseLink (Dropbox, see Section 6.4 of this course outline), on or before the due date at 11:59pm. Email submissions will not be accepted unless agreed upon ahead of time with the instructor. No late submissions will
be accepted without medical or compassionate justification.

You should remember that a technical difficulty is not a valid excuse to turn in an assignment late. Don’t wait until the last minute as you may get behind in your work. Be sure to keep a back-up copy of all your assignments: to avoid any last-minute computer problems, save your assignments to a cloud-based file storage (e.g., Google Docs, OneDrive) or send copies to your email account so that should something happen to your computer, your assignment can still be submitted on time or re-submitted.

7.2 Course Policy on Group Work

The take-home portion of the Mid-Term Exam must be completed individually. Discussion on lab exercises is encouraged but the work submitted should be your own.

7.3 Communication

You are required to check your uoguelph email on a regular basis, as important messages related to this course may be sent from CourseLink. You are also required to check the course website (CourseLink) regularly for special announcements, new documents to download, etc. The course instructors will do their best to answer emails within 48 hours (weekends and holidays excepted). However, you should remember that the best time to communicate with the instructors is during class time.

8 University Statements

8.1 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.

8.2 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

8.3 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-regregchg.shtml

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

8.4 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.

8.5 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 book their exams at least 7 days in advance and not later than the 40th Class Day.

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

8.6 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

8.7 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.

8.8 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

8.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

8.10 Illness

The University will not normally require verification of illness (doctor’s notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.