

ENVS\*2030 Meteorology and Climatology

## Fall 2017

Sections(s): C01

School of Environmental Sciences Credit Weight: 0.50

Version 1.00 - September 06, 2017

# Course Details

## 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-Requisite(s):

**Equate(s):**

* 1. Course Description

1 of ENVM\*1120, IPS\*1500, MATH\*1080, MATH\*1200, PHYS\*1080, PHYS\*1130

MET\*2030

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.

## Timetable

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

### Class Schedule and Location:

Lectures Crop Science 117 MWF 10:30—11:20

Lab section 1: MacKinnon 234 Th 15:30—17:20

Lab section 2: MacKinnon 307 W 15:30—17:20

## Final Exam

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

# Instructional Support

## Instructor(s)

**Jon Warland** Email: Telephone:

Office:

[jwarland@uoguelph.ca](mailto:jwarland@uoguelph.ca)

+1-519-824-4120 x56374

Bovey 1106

Office Hours:

### Claudia Wagner-Riddle

Email: Telephone: Office:

MWF 11:30—12:20

[cwagnerr@uoguelph.ca](mailto:cwagnerr@uoguelph.ca)

+1-519-824-4120 x52787

ALEX (AXEL) 110

Office Hours:

MWF 11:30—12:20

# Learning Resources

## Recommended Resources(s)

### Meteorology Today: An Introduction to Weather, Climate, and the Environment by C. Donald Ahrens, Peter L. Jackson, and Chris Jackson, 1st Canadian edition, published by Nelson (ISBN-10: 0-17-650039-1, (Textbook)

1. Learning Outcomes

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

## 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

diagram;

* + 1. Describe the Bergeron process for formation of precipitation using the concept of vapour pressure over water and ice;
    2. Predict wind speed and direction from isobars and isoheights using a force-body diagram;
    3. Access public data on weather and climate, including historical records, current and forecast conditions;
    4. Interpret surface and upper air weather maps, including all basic symbols, and use this to state current weather conditions at any point;
    5. 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;
    6. Use the Hadley cell model, trade winds and the ITCZ to explain precipitation patterns in the tropics;
    7. Apply simple models to predict the dispersion of air pollutants;
    8. Explain uncertainties in climate change predictions using the concepts of positive and negative feedback in the climate system.

# Teaching and Learning Activities

## Lecture Schedule

|  |  |  |
| --- | --- | --- |
| Date | Topics(s) | Details |
| Week of Sep 8 | Introduction | Instructor: C. Wagner-Riddle |
| Week of Sep 11 | Radiation | Instructor: C. Wagner-Riddle |
| Week of Sep 18 | Radiation | Instructor: C. Wagner-Riddle |
| Week of Sep 25 | Water in the Atmosphere | Instructor: C. Wagner-Riddle |
| Week of Oct 2 | Stability and Clouds | Instructor: J. Warland |
| Week of Oct 9 | Precipitation Processes | Instructor: J. Warland |
| Week of Oct 16 | Atmospheric Motions | Instructor: J. Warland |
| Week of Oct 23 | Atmospheric Motions | Instructor: J. Warland |

|  |  |  |
| --- | --- | --- |
| Date | Topics(s) | Details |
| Week of Oct 30 | Air Masses and Fronts | Instructor: J. Warland |
| Week of Nov 6 | Air Masses and Fronts | Instructor: J. Warland |
| Week of Nov 13 | Tropical Weather Systems | Instructor: C. Wagner-Riddle |
| Week of Nov 20 | Air Quality | Instructor: C. Wagner-Riddle |
| Week of Nov 27 | Climate Change | Instructor: C. Wagner-Riddle |

* 1. Laboratory Schedule

|  |  |  |
| --- | --- | --- |
| Date | Topics(s) | Details |
| Week of Sep 11 | No lab |  |
| Week of Sep 18 | Radiation | Instructor: C. Wagner-Riddle |
| Week of Sep 25 | No lab |  |
| Week of Oct 2 | Climate and Comfort | Instructor: C. Wagner-Riddle |
| Week of Oct 9 | No lab |  |
| Week of Oct 16 | Stability | Instructor: J. Warland |
| Week of Oct 23 | No lab |  |
| Week of Oct 30 | Wind and Maps | Instructor: J. Warland |
| Week of Nov 6 | No Lab |  |
| Week of Nov 13 | Fronts and Forecasting | Instructor: J. Warland |
| Week of Nov 20 | Air Quality (Thurs. class) | Instructor: C. Wagner-Riddle |
| Week of Nov 27 | Air Quality (Wed. class) | Instructor: C. Wagner-Riddle |

* 1. Labs:

Lab assignments will be posted on CourseLink. Please bring a copy with you to each lab.

# 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%).

## Marking Schemes & Distributions

|  |  |
| --- | --- |
| Name | Scheme A (%) |
| Lab Exercise on Radiation\* | 4.00 |
| Lab Exercise on Human Comfort\* | 4.00 |
| Lab Exercise on Stability\* | 4.00 |
| Lab Exercise on Wind and Maps\* | 4.00 |
| Lab Exercise on Fronts and Forecasting\* | 4.00 |
| Lab Exercise on Air Pollution\* | 4.00 |
| Mid-Term Exam 1 | 20.00 |
| Mid-Term Exam 2 | 20.00 |
| Final Exam | 40.00 |
| Total | 104.00 |

* 1. Assessment Details

**Lab Exercise on Radiation\* Date:** Friday, September 22

**Lab Exercise on Human Comfort\* Date:** Friday, October 6

**Lab Exercise on Stability\* Date:** Friday, October 20

**Lab Exercise on Wind and Maps\* Date:** Friday, November 3

**Lab Exercise on Fronts and Forecasting\* Date:** Friday, November 17

**Lab Exercise on Air Pollution\* Date:** Wednesday, November 29

### Mid-Term Exam 1

**Date:** Week 6

Oct 13 (in-class part, 15%); Oct 16 (take-home part, 5%)

### Mid-Term Exam 2

**Date:** Week 11

Nov 10 (in-class part, 15%); Nov 13 (take-home part, 5%)

### Final Exam

**Date:** Monday, December 7

Scheduled by Registrar - Dec 7, 2015, 19:00—21:00

## Lab Marks\*

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

# Course Statements

## Grading Policies

No late submissions will be accepted without medical or compassionate justification, documentation may be requested.

## 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.

# School of Environmental Sciences Statements

## Academic Advisors

If you are concerned about any aspect of your academic program:

* + - Make an appointment with a program counsellor in your degree program. B.Sc. Academic [Advising](https://bsc.uoguelph.ca/) or [Program Counsellors](https://www.uoguelph.ca/uaic/programcounsellors)

## Academic Support

If you are struggling to succeed academically:

* + - Learning Commons: There are numerous academic resources offered by the Learning [Commons](http://www.learningcommons.uoguelph.ca/) including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.
    - Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: [Chemistry & Physics Help](http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help) and [Math & Stats Help](http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help)

## Wellness

If you are struggling with personal or health issues:

* + - [Counselling Services](https://www.uoguelph.ca/counselling) offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.
    - [Student Health Services](https://www.uoguelph.ca/studenthealthservices/clinic) is located on campus and is available to provide medical attention.
    - For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to [stress management and high performance situations](http://www.uoguelph.ca/%7Eksomers/).

# University Statements

## 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.

## 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 regulations and procedures for [Academic Consideration](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml) are detailed in the Undergraduate Calendar.

## Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two- semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for [Dropping Courses](https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml) are available in the Undergraduate Calendar.

## 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.

## 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.

More information: [www.uoguelph.ca/sas](http://www.uoguelph.ca/sas)

## Academic Misconduct

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://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml) is detailed in the Undergraduate Calendar.

## Recording of Materials

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

## Resources

The [Academic Calendars](https://www.uoguelph.ca/registrar/calendars/) are the source of information about the University of Guelph’s procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.