

ENVS\*3340 Use and Management of Environmental Data

## 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 is focused on finding, collecting and interpreting data of the physical environment. Students will access various online databases, such as meteorological and hydrological time series, and perform and interpret statistical analysis with the data. Issues around calibration and data collection will be explored by performing calibrations and experiments. Students will make a numerical simulation of a dynamic environmental phenomenon. Students will learn to build and query a relational database with both qualitative and quantitative data.

### Pre-Requisite(s): Restriction(s):

* 1. Timetable

1 of GEOG\*2460, STAT\*2040, STAT\*2060 ENVS\*4110

Lecture TTh 10:30-11:20am, Alex 028 Lab 01: F 8:30-11:20am, Alex 020

Lab 02: M 8:30-11:20am, Alex 020

## Final Exam

1. Instructional Support
   1. Instructor(s)

### Jon Warland

Email:

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

Telephone: Office:

Office Hours:

+1-519-824-4120 x56374

ECBA 1106

By appointment

## Teaching Assistant(s)

|  |  |
| --- | --- |
| Name | Details |
| Olivia Kaminski | [okaminsk@uoguelph.ca](mailto:okaminsk@uoguelph.ca) TBD |
|  |  |

1. Learning Resources
   1. Recommended Resources(s)

### An Introduction to Error Analysis by John R. Taylor (Textbook)

QA275.T38

### Statistics: An Introduction Using R by Michael J. Crawley (Textbook)

* 1. Other

Google is useful for this course.

# Learning Outcomes

## Course Learning Outcomes

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

* + 1. Identify and access public environmental databases and use the data in analyses.
    2. Select, implement and interpret statistical analyses of environmental data.
    3. Perform basic calibration procedures on environmental sensors.
    4. Collect field data using multiple techniques and quantify errors and uncertainties in the data.
    5. Create a simulation of a dynamic environmental phenomenon.
    6. Recognize and suggest appropriate safety practices for environmental field work.
    7. Communicate results in writing, orally and graphically meeting appropriate scientific standards.

# Teaching and Learning Activities

## Labs

* + 1. Mark up languages, text files and intro to R
    2. Plotting in R, putting figures and tables into documents
    3. Analysis of correlation of weather with distance
    4. Analysis of handheld weather station data
    5. ANOVA/ANCOVA
    6. Multiple measurement techniques and analysis of errors
    7. Random walk model
    8. Soil heat flow model
    9. Final project: Analysis of future climate data

## Lectures

|  |  |
| --- | --- |
| Sept 7 | Introduction to course and Lab 1 |
| Sept 12 | How to lie with stats (not really) |
| Sept 14 | Visual display of information - graphs |
| Sept 19 | Central tendency and variance |
| Sept 21 | Correlation and covariance |
| Sept 26 | class cancelled |
| Sept 28 | Regression analysis |
| Oct 3 | Options and advice for post-undergrad |
| Oct 5 | ANOVA/ANCOVA |
| Oct 12 | Practical data management |
| Oct 17 | Principles of calibration |
| Oct 19 | Introduction to Lab 6 |
| Oct 24 | Mid-term (in-class) |
| Oct 26 | Random walk modelling |
| Oct 31 | The variety of numerical simulations |
| Nov 2 | Dynamic process-based modelling |
| Nov 7 | Climate change and intro to Lab 9 |
| Nov 9 | Weather and climate modelling |
| Nov 14 | Probability/frequency analysis |
| Nov 16 | Normalizing data |
| Nov 21 | TBD |
| Nov 23 | Time series analysis |
| Nov 28 | Experimental data and scientific theory |
| Nov 30 | Review |

1. Assessments
   1. Marking Schemes & Distributions

|  |  |
| --- | --- |
| Name | Scheme A (%) |
| Lab1 | 5.00 |
| Lab 2 | 5.00 |

|  |  |
| --- | --- |
| Name | Scheme A (%) |
| Lab 3 | 10.00 |
| Lab 4 | 10.00 |
| Lab 5 | 10.00 |
| Midterm | 10.00 |
| Lab 6 | 10.00 |
| Lab 7 | 10.00 |
| Lab 8 | 10.00 |
| Lab 9 | 20.00 |
| Total | 100.00 |

* 1. Assessment Details

### Lab1

**Date:** Friday, September 8

Mark-up languages, text files and R

### Lab 2

**Date:** Friday, September 15

Making pretty graphs in R, putting tables and figures into documents

### Lab 3

**Date:** Friday, September 22

Analysis of change in correlation of weather with distance

### Lab 4

**Date:** Friday, September 29

Collect data using handheld logger, analyze by comparison with other data

### Lab 5

**Date:** Friday, October 13 ANOVA/ANCOVA

### Lab 6

**Date:** Friday, October 20

Estimate building height with several methods, analyze errors

### Lab 6

**Date:** Friday, October 28

Build numerical simulation of soil heat flow in a spreadsheet

### Midterm

**Date:** Tuesday, October 24

### Lab 7

**Date:** Friday, October 27

Program random-walk model

### Lab 8

**Date:** Friday, November 3

Program dynamic process-based model: soil heat flow

### Lab 9

**Date:** Tuesday, November 7

Analyze Ontario Climate Change Data Portal future weather data. Introduced in class Nov 7, done on own time with instructor help available in lab times Nov 10, 13, 17, 20, 24, and 27.

# Course Statements

## Group work

Work in groups, hand in 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.