



UNIV*6020 Experimental Design and Applied Data Analysis for the Agricultural Sciences

Fall 2022
Section(s): c01

Department of Plant Agriculture
Credit Weight: 0.50
Version 1.00 - August 23, 2022

1 Course Details

1.1 Calendar Description

This two-semester course focuses on statistical principles, experimental designs, and communication of findings to research peers within the agricultural field. Students apply statistical techniques and perform data analyses.

1.2 Course Description

This course will be offered as a set of modules, with each module lasting 1-2 weeks. The course will be offered in the F and W semesters, with mandatory modules offered in the Fall semester, and optional modules at the end of the Fall and into the Winter semesters. The goal of this modular course is to offer flexibility to students and to provide a base knowledge of applied data analyses so that departments and faculty members can teach more advanced and specialized courses.

Students, with their advisors, must select the required number of modules, to provide 12 weeks of instruction in total, to obtain credit for the course. There are 4 modules that are MANDATORY – these will cover a review of the classical statistical inference tests, including t-test, F-test, type I and II errors, confidence intervals, a discussion on p-values; the basics of experimental designs, and regression analyses. Optional topics will include an introduction to Meta-Analysis, an introduction to Exploratory Statistics, additional experimental designs, and other topics. Additional modules may be added to meet specific needs as they arise, with faculty collaboration.

Please note that examples used throughout the course will be from the agricultural and natural science fields, to cover topic areas studied in OAC.

1.3 Timetable

Lectures: ANNU 156

- Monday 8:30 am - 9:20am
- Wednesday 8:30 am - 9:20am
- Friday 8:30 am - 9:20am

Labs: ALEX 028

- Section 01: Wednesday 2:30pm - 4:20pm
- Section 02: Monday 11:30am - 1:20pm

1.4 Final Exam

N/A

2 Instructional Support

2.1 Instructional Support Team

Instructor: Amir B. Bazrgar
Email: abazrgar@uoguelph.ca
Telephone: +1-519-824-4120 x53488
Office: ALEX 273

Office Hours:

- Monday during Lab hours
- All other times by appointment
- Email: Please include UNIV6020 in the Subject Line

3 Learning Resources

3.1 Recommended Resources

Recommended Texts (Textbook)

1. Bowley, S.R. 2015. A hitchhiker's guide to statistics in biology. Generalized Linear Mixed Model Edition. Plants et al., Kincardine ON. ISBN 978-0-9685500-4-5
2. Kuehl, R.O. 2000. Design of Experiments: Statistical Principles of Research Design and Analysis. 2nd edition. Duxbury Press. CA, USA.

Both texts are available on Reserve in the Library

3.2 CourseLink

CourseLink will be used to distribute assignments, data files, information, and other materials associated with the course. You will also use this to submit the pdf copy of your SAS/R analyses for the graded reports. There are also four graded quizzes during the course; these will be conducted on-line via CourseLink.

Note that if you are in arrears regarding tuition fees, your access to the CourseLink website will be unavailable until you have settled matters with the Registrar's Office.

Marks will be collated in CourseLink throughout the course. It is your responsibility to review these grades and report if there are any discrepancies. Keep paper and/or other reliable back-up copies of all in- and out-of-class assignments: You may be asked to resubmit work at any time.

3.2 Statistical Computing Software

To perform the statistical analyses in this course you will be required to use SAS or R. You will only need 1 of the 2 packages.

SAS: There are 2 options available. The licensed version is available through CCS at a cost. The second option is to create an account on the SAS OnDemand Service.

R: You will need to download and install both R and RStudio.

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Select and differentiate among classical inference statistical tests;
 2. Choose an appropriate experimental design to match research goals and available resources;
 3. Identify and analyze statistical models that match experimental designs and/or research goals;
 4. Critique, evaluate, and defend data analyses and research outputs to their peers;
 5. Apply research data management skills to their own research.
-

5 Teaching and Learning Activities

5.1 Lecture

Topics:

F22 Weeks 1-8

- Mandatory Modules
 - Topics will range from review of statistical tests to partitioning of variation to experimental designs.

F22 Weeks 9-12 **AND** W23 Weeks 1-6

- Optional Modules
 - Variety of Agricultural Statistics topics with a

mix of OAC faculty Guest lectures

W23 Weeks 7-12

- Final Project Presentations
-

6 Assessments

6.1 Assessment Details

Data Analysis Assignment #1 (10%)

Due: Fri, Oct 14

Learning Outcome: 1, 2

Data Analysis Assignment #2 (10%)

Due: Fri, Oct 28

Learning Outcome: 1, 2, 3

Data Analysis Assignment #3 (10%)

Due: Fri, Nov 11

Learning Outcome: 2, 3

OPTIONAL MODULE #1 Data Analysis Assignment (5%)

Due: 1 week after MODULE completion date

Learning Outcome: 2, 3, 4, 5

OPTIONAL MODULE #2 Data Analysis Assignment (5%)

Due: 1 week after MODULE completion date.

Learning Outcome: 2, 3, 4, 5

OPTIONAL MODULE #3 Data Analysis Assignment (5%)

Due: 1 week after MODULE completion date

Learning Outcome: 2, 3, 4, 5

On-line quiz 1 (10%)

Due: Fri, Sep 23

Learning Outcome: 1

On-line quiz 2 (5%)

Due: Fri, Oct 7

Learning Outcome: 1

On-line quiz 3 (5%)

Due: Tue, Nov 8

Learning Outcome: 1, 3

On-line quiz 4 (5%)**Due:** Fri, Feb 17**Learning Outcome:** 1, 2, 3, 4, 5**Final Project Report and Presentation (30%)****Due:** Fri, Apr 7**Learning Outcome:** 1, 2, 3, 4, 5

6.2 Audit Students

To receive an "Audit" from this course, you are required to:

1. Complete three quizzes
 2. Submit two data analysis reports
-

7 Course Statements

7.1 Course Constraints

There is a **ban** on the use of writing services and statistical analysis services for all reports submitted in this course.

7.2 Quizzes

Quizzes will be available on-line through CourseLink between the time-period: 6 pm on the last day of the Module to 11:59 pm 2 week days later. To receive a mark, you must complete the quiz during this time interval. You are allowed up to two attempts to write each quiz. Your recorded grade will be the average of all attempts. You do not require access to SAS or R in order to complete the quiz.

7.3 Data Analysis Assignments

The data analysis reports must be submitted electronically as **PDF** files via the CourseLink Dropbox by 8:30 am on the due date.

7.4 Final Project

To be submitted electronically via the CourseLink Dropbox by 8:30am on the due date. Late reports will not be accepted after the dropbox closes and these will receive a 0 grade.

7.5 Conflict with a Due Date

If a due date for an assignment / quiz conflicts with a scheduled academic activity such as attendance at a conference, an activity involving a research project, or personal issues such as medical procedures, jury duty, etc., email me ahead of time so we can make alternate accommodation.

7.6 Course Policy on Group Work

It is anticipated that you will work on the assignments in study groups, however, the

assignments and reports you submit for grading **must be independent and document only your work.**

Plagiarism will be strongly suspected if two or more students submit individual projects that have identical or substantially identical components. Tables, figures, paragraphs in reports should reflect your own efforts, not be copies or essential derivatives of work performed by someone else. See "Academic Misconduct" below for the procedures that are followed if this arises.

7.7 Course Policy regarding use of electronic devices and recording of lectures

Electronic recording of classes is expressly forbidden without the prior consent of the Instructor. This prohibition extends to all components of the course, including, but not limited to, lectures, seminars, and lab instruction. If recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the Instructor.

7.8 Additional Course Information - Style Guide

Tables and figures should be suitable for submission to one of the refereed journals of the Agricultural Institute of Canada (AIC) such as the Can. J. Plant Sci. or the Can. J. Anim. Sci. The citation format is Council of Science Editors (CSE) Name-year. Title, figures, tables and footnotes (if any) should be self-explanatory so that one can interpret what is being presented without one having to refer to the methods/results. Titles need to be brief but sufficiently detailed to explain the data and statistical analysis.

AIC style guide:

<https://www.aic.ca/publications/journals/>

<https://cdnsiencepub.com/journal/cjps/authors#guidelines>

See the guidelines for authors for each journal. follow the instructions as a reference guide for the figures and tables to submit to UNIV*6020. Focus on this phrase: Figures and tables should be self-explanatory so that one can interpret what is being presented without having to refer to the methods/results. Unfortunately, many published papers contain tables that have lots of wasted real estate in which one could incorporate one or two words or phrases, or a

brief footnote to provide greater clarity, especially related to the statistics.

Figures & tables are to be suitable for submission for review of a manuscript. There are two notable exceptions for the assignments for this course: 1) Do not turn on line numbering; and, 2) Place the title of a Figure on the same page as the figure image – do not place the Figure title on a separate page (as you would typically do for a manuscript).

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-reg->

regchg.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 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>

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, 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.

8.10 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).

8.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your->

safe-return/

- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

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