University of Guelph
Department of Mathematics and Statistics
Course Outline: Stat*3210 Fall 2022
Experimental Design

General Information

Course Title: Stat*3210: Experimental Design

Course Description: This course presents the basic principles of design: randomization, replication, and local control (blocking); RCBD, Latin square and crossover designs, incomplete block designs, factorial and split-plot experiments, confounding and fractional factorial designs, response surface methodology; linear mixed model computer analysis of the designs; nonparametric methods; Taguchi philosophy.

The above is the official description in the course calendar.

Credit Weight: 0.5

Prerequisite: Stat*2050

Academic Department (or campus): Mathematics & Statistics

Campus: University of Guelph

Semester Offering: Fall 2022

Class Schedule and Location: Lectures are scheduled on Monday, Wednesday and Friday from 2:30PM to 3:20PM; these will primarily be delivered as "face-to-face" lectures. The course will be held in MCKN 227, at least initially, but I am hoping to get a change to a room with two projectors and two screens. Face-to-face lectures will not be recorded.

The lecture on Friday October 7 will be held remotely, via Zoom. This is the Friday prior to the four-day break. The reason for doing this lecture via Zoom is so that it can be recorded and thus provide greater flexibility for student travel plans near the break.

Other remote lectures (either synchronously or asynchronously) are possible, but it is expected that these will only constitute a minor proportion of the total lecture content.

The location of a lecture may change if a "field trip" can be arranged.

Note that the lecture on Friday December 2 is a "makeup" lecture for the missed lecture on Monday October 10.

Instructor Information

Name: Gary J. Umphrey

Email: umphrey@uoguelph.ca

Office Phone: (519) 824-4120 x53288 (voice mail here)

Office location and office hours: Office hours are T.B.A. My office is in MacNaughton 551, but I may not be holding all office hours there. I will have some remote office hours via Zoom (or similar platform); these are scheduled rather flexibly throughout the semester. Whenever possible I will meet with students after our face-to-face classes to answer questions. We may take advantage of outdoor areas to meet if the weather is suitable.

GTA Information

Name: Patrick McMillan

Instructor Email: stat3210@uoguelph.ca

Course Content

Specific Learning Outcomes:

I try to optimize the educational outcomes for each student in the course. Specifically some of the outcomes I consider desirable are:

- Increase the breadth and depth of your knowledge in the statistical field of Experimental Design.
- Improve your capacity to plan and implement designed experiments, and to analyze and interpret the data generated.
- Increase your understanding of how designed experiments strengthen scientific inference.
- Gain a stronger appreciation of the issues and tradeoffs that researchers face in attempting to design experiments that are efficient for generating desired information.
- Strengthen your understanding of the role of mathematical models for condensing and communicating information.
- Improve your capacity to communicate statistical results.

Lecture Content:

We will cover, to varying degrees of depth, most of the topics covered by Oehlert (see the Course Description and schedule below for guidance). Other topics may appear in the course that are not covered by Oehlert. You need to keep on top of the lecture, assignments and other course materials as we progress through the semester.

Here's an approximate schedule of course topics:

Week 1: Overview of some key designs, getting started quickly

Week 2: Principles of Experimental Design, including data analysis

Week 3: Contrasts; multiple comparison procedures

Week 4: More on factorial designs

Week 5: Nested designs

Week 6: More on fixed effects, random effects and mixed effects

Week 7: Split-plot designs and variants

Week 8: More on Latin square designs and variants

Week 9: Incomplete block designs

Week 10: Fractional factorial designs

Week 11: Response surface designs

Week 12: Additional topics in Experimental Design

Labs:

This course does not have a lab, but you will be working with hands-on statistical analyses using R statistical software during at least some of the synchronous classes. Make sure to install the latest version of R (and/or R-Studio) on your computer.

Course Assignments and Tests:

Assignments will be given throughout the semester, but these will not be graded. Evaluation will be based on two tests, a project and a final exam. The tests and final exam will focus on assignment and lecture content.

Here's how the various course components will contribute to your final grade:

Test 1	20%
Test 2	20%
Project	25%
Final Exam	35%

Tentative test dates are: Test 1: Friday October 14
Test 2: Friday November 11

The test dates and locations will be announced ASAP. Details of the format will be given in class.

Project:

In your project you will analyze an experimental design data set of your own choice and write a short report (about 10–12 double spaced, typed pages) on your analysis. Each student will work on a unique data set. The complexity of the data set, the sophistication of your analysis, and the quality of your writing and graphics will be factors in the grading. Further guidance will be given in class and you are welcome to discuss your choice of project with me. The project will be due on the last day of classes.

Final examination date and time:

Thursday, December 8, 2022, 11:30AM–1:30PM

The exam location will be announced later by the Registrar.

Course Resources

Required Texts:

This semester we will use Gary Oehlert's (2000) text, "A First Course in Design and Analysis of Experiments", which Dr. Oehlert has generously made available for free as a pdf download. You can find the link here:

http://users.stat.umn.edu/~gary/Book.html

Other Resources:

I will be providing other materials as we move through the course.

Course Policies

Grading Policies

If you miss a test or the final exam, I will try to provide an alternative test or exam for you. I cannot guarantee that this will occur during the current semester.

Your project must consist of your work. Please review the University Policies on Academic Misconduct, and be sure to ask if you are uncertain as to what might constitute plagiarism.

Course Policy on Group Work:

No part of the graded course components involve group work.

University Policies

Email Communication
As per university regulations, all students are required to check their <uoguelph.ca> 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. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration.

Drop Date
Courses that are one semester long must be dropped by the end of the last day of classes; two-semester courses must be dropped by the last day of classes in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

Copies of Out-Of-Class Assignments
Not applicable.

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.
More information: 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 is outlined 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 are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

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.

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).

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