

Course Outline Form: Winter 2016

General Information

Course Title: STAT*2050: Statistics II

Course Description: In this course, students will learn how to implement good study design and analyze data from complex studies. This course follows naturally from STAT*2040 and features both previously unseen statistical techniques, as well as studying in greater depth some topics covered in STAT*2040. These topics will include: experiments and observational studies; a review of t-tests and confidence intervals; confounding variables; association and causality; Analysis of Variance (ANOVA); simple and multiple linear regression; binary responses (logistic regression); odds ratios and relative risk; and an introduction to experimental design (including blocked designs and factorial treatment designs). Assignments carried out using modern statistical software will form the basis for mastering the material.

Prerequisites: STAT*2040

Exclusions: BIOL*2250, STAT*2090, STAT*2250

Credit Weight: 0.5 credit

Academic Department (or campus): Mathematics & Statistics

Campus: Guelph

Semester Offering: Winter

Class Schedule and Location: Monday, Wednesday, Friday, 3:30pm – 4:20pm in RICH 2520

Instructor Information

Instructor Name: Dr. Lorna Deeth

Instructor Email: ldeth@uoguelph.ca, or by phone at ext. 53034 (no voicemail!)

Office location and office hours: MACN 548. Office hours are Tuesdays & Thursdays, 1:30 – 3:30pm, or by appointment.

Course Content

Specific Learning Outcomes:

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

- explain the design of some basic experiments and observational studies, and describe how statistical conclusions differ between experiments and observational studies.
- choose an appropriate statistical inference procedure in a variety of situations, carry out the procedure, and effectively communicate a proper interpretation of the results.
- explain the concepts of simple linear, multiple linear, and logistic regression analysis, identify when it is appropriate to use each method of analysis, and appropriately interpret the results of the analysis.
- identify various types of simple experimental designs, carry-out the corresponding statistical analysis, and provide proper interpretation of the results.
- carry out the calculations for statistical inference procedures, regression analysis, and basic experimental design calculations using appropriate statistical software.

Lecture Content:

The lecture content will cover the topics of:

- experiments and observational studies; association and causality; confounding variables;
- a review of statistical inference using t procedures;
- Analysis of Variance (ANOVA);
- simple and multiple linear regression;
- logistic regression (binary response);
- odds ratios and relative risk;
- introductory concepts in experimental design: completely randomized designs, randomized complete block designs, and factorial designs.

Course Assignments and Tests:

Course Component	Date	Due Date & Location	Weight
Assignment 1	Wednesday, January 27	3:00pm to the orange IN-BOX (3 rd floor of the library)	20% (equally weighted)
Assignment 2	Wednesday, February 24	3:00pm to the orange IN-BOX (3 rd floor of the library)	
Assignment 3	Wednesday, March 16	3:00pm to the orange IN-BOX (3 rd floor of the library)	
Term Test #1	Friday, February 5	3:30pm – 4:20pm (in class)	15%
Term Test #2	Friday, March 4	3:30pm – 4:20pm (in class)	15%
Term Test #3	Wednesday, March 23	3:30pm – 4:20pm (in class)	15%
Final Exam	Monday, April 18	8:30am – 10:30am (Location TBA)	35%

Course Resources

Text: There is no required textbook for this course, as the course notes will serve as the primary resource for students. However, students are encouraged to access the following online textbooks (and corresponding chapters), available through the University of Guelph Library, as additional resources:

Regression Analysis by Example, 4th Edition. (2006). Chatterjee, S. & Hadi, A.S. (Chapters 1 – 6, 12).

Design and Analysis of Experiments in the Health Sciences (2012). Van Belle, G. & Kerr, K. (Chapters 1 – 5).

Other Resources:

Lecture notes: A weekly set of incomplete lecture notes will be posted on Courselink. It is expected students will have a copy of these notes available, and will fill them in during lectures. Completed lecture notes will not be posted online.

THE LECTURE NOTES ARE FOR INDEPENDENT USE ONLY, AND ARE NOT TO BE RE-DISTRIBUTED IN ANY FORM WITHOUT MY WRITTEN PERMISSION.

Computer software: The primary statistical software package that will be used in this course is **R**, which is freely available for download at <http://www.r-project.org/>. Students are strongly encouraged to install **R** on their personal computers.

Learning Centre: Drop-in help is available in the Statistics Learning Centre (Science Commons, 3rd floor of the library) for students seeking help with course content and/or assignments. Hours of operation are Monday/Wednesday: 9:30am – 3:30pm, Tuesday/Thursday: 10am – 4pm, Friday: 9:30am – 2:30pm. Students are expected to use the Statistics Learning Centre as a primary resource for help with course material.

R Drop-in Help: There are no labs associated with the course; however students can obtain help using **R** by visiting the TAs during drop-in **R** help in the Science Complex computer labs. The drop-in help hours are 12:30pm – 2:30pm daily, in SSC 1305.

Calculators: Students are strongly encourage to obtain (and know how to use!) a good, multi-variable calculator. Calculators will be needed to write the terms tests and final exam. I also recommend that you bring a back-up calculator to all evaluations.

Courselink: Course information and resources (such as assignments, data sets, etc.) will be available on Courselink. Students are encouraged to check the website regularly for updated information and announcements.

Course Policies

Grading Policies:

Assignments: There will be 3 assignments throughout the semester. Assignments are due to the orange IN-BOXES (3rd floor of the library, outside the Math & Stats Learning Centre), by the stated time. Students must complete, print and staple the cover page template to each assignment (this is done to maintain confidentiality of your personal information and grades). Make sure to include your name AND student ID# on the second page of your assignment. **No late assignments will be accepted, and late or missed assignments will automatically receive a grade of 0.**

Students are responsible for answering all questions on an assignment; however for some assignments not every question will be marked. Full solutions will be posted on Courselink, and it is your responsibility to review the solutions and evaluate your performance on unmarked questions.

Term Tests: All three term tests will be held during the class time, and therefore no student should have a conflict with the date or time. If a conflict does exist, **it is your responsibility to resolve it immediately**. Students who miss the midterm for a valid, documented reason (such as a medical illness) must contact me within 3 business days of the midterm, and provide the appropriate documentation. In this situation, the weight of the missed test will be added to the final exam.

The final exam (date, time and location) is scheduled by the Registrar's Office. Students who miss the final exam due to a valid, documented reason must contact their program counsellor for advice on University regulations regarding final exams. These procedures are based on University policy, and are not under the control of the course instructor.

For the term tests, students are permitted **one** double-sided 8.5 x 11 (letter size) reference page for Term Test #1, **two** such pages for Term Test #2, **three** such pages for Term Test #3, and **four** such pages for the final exam. You are free to write whatever you would like on your reference pages. For both the term tests and the final exam, students will be allowed a stand-alone calculator, however cell phones and/or laptop computers may not be used as calculators during the midterm or exam, and will be confiscated.

Course Policy on Group Work:

Students are encouraged to work together to discuss course content, share ideas, and ask/answer questions. However, all submitted work must be done **independently** unless it is explicitly stated students are allowed to submit collaborative work. Completing another student's work, or having another student complete your work, will constitute academic misconduct.

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

Electronic recording of classes is expressly forbidden without consent of the instructor. When 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.

University Policies

Academic Consideration:

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

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 detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Accessibility:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

Course Evaluation Information:

Please see <http://www.mathstat.uoguelph.ca/files/TeachevaluationformF10.pdf>

Drop date:

The last date to drop one-semester courses, without academic penalty, is **Friday, March 11, 2016**. For regulations and procedures for Dropping Courses, see the Academic Calendar: <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Additional Course Information

Any additional information regarding the course, including (but not limited to) important announcements, assignment information, test room confirmations, etc., will be posted on Courselink. Students are encouraged to check this website daily for any new information.