



Health Sciences 3801b — *Measurement and Analysis in Health Sciences*

School of Health Studies, Faculty of Health Sciences

January to April 2017

### **Instructor**

Christopher Lee, PhD

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Room 217, Labatt Health Sciences Building

Office Hours: Tuesdays 10:00 to noon

### **Labs – 1 hour**

Fridays, 8:30 to 9:20, NSC 145

### **Classes – 2 hours**

Fridays, 9:30 to 11:20, NSC 1

### **Prerequisite Checking**

Unless you have either the requisites for this course or written special permission from your Dean to enrol in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

### **Course Information**

This course is an introduction to statistical analysis in health sciences research. Although formulas are given and calculations are performed, the principal orientation of the course is conceptual rather than mathematical. Your grade in this course is based on two online quizzes and a final exam.

### **Detailed Description of Course Topics**

#### *Science*

- Popper's falsification principle; Kuhn's conception of normal science, extraordinary science, paradigm, and scientific revolution; Cleland's two characteristic forms of scientific reasoning; Crease's characteristics of a good experiment; null hypothesis significance testing, type one error, type two error, power.

#### *Simple Experiment*

- between-groups and repeated-measures designs; calculation of a  $t$  ratio and confidence interval; sample size estimation using Cohen's  $d$ .

#### *Analysis of Variance*

- between-groups and repeated-measures designs; calculation of an  $F$  ratio; Cohen's  $f$ , *eta squared*; pairwise comparisons using bonferroni minimum significant difference.

### *Simple Regression*

- linear regression with one independent variable; predicted score; regression sum of squares; residual sum of squares; standard error of the slope; standardized slope; goodness of fit; effect of unsystematic error.

### *Multiple Regression*

- linear regression with two independent variables; Cohen's ballantine diagrams; goodness of fit; squared partial and semipartial correlations; effect of multicollinearity.

### *Assumptions and General Principles*

- homogeneity of variance, homoskedastisty, sphericity of repeated measurements, normality, and generalizability.

### *Factorial Designs*

- orthogonality; interaction effects; paired comparisons.

### *Clinical Judgment & Clinical Expertise*

- clinical judgment; models of consent; clinical expertise.

## **Course Materials**

There is no textbook to be purchased for this course. A set of PDF readings is posted in OWL to accompany the classes. Each reading provides a short introduction to the topic and includes a series of cases that we will work through in class.

## **Evaluation**

Your grade in this course is based on two online quizzes and a final exam. Each quiz is worth 24 percent of your course grade, and the final exam is worth 52 percent of your course grade.

The quizzes are one-hour in length, and they are administered online using OWL. The quizzes are scheduled for **Friday February 10** and **Friday March 17**. There is no class nor lab scheduled on these two Fridays. Each quiz will be open for a 12-hour period (8:00 am to 8:00 pm). You can login to OWL at any time during this period to complete the quiz. The first quiz covers readings 1 to 3, and the second quiz covers readings 1 to 5. The final exam covers all of the readings. The quizzes are open-book in the sense that you have access to your notes and the readings while completing a quiz. The final exam is *not* open-book. I strongly encourage you to prepare for the quizzes as you would an exam and to complete the quizzes on you own, without collaboration with other students.

If you are unable to complete a quiz during the scheduled time as a result of medical illness or non-medical reasons, you must consult an academic counsellor to obtain academic accommodation. Once academic accommodation is obtained, the percentage associated with the missed quiz will be evenly distributed between the other quiz and the final exam. For example, if you were unable to complete the first quiz because of illness, the second quiz would be worth 36 percent (i.e., 24% + 12%), and the final exam would be worth 64 percent (i.e., 52% + 12%).

If you miss the final exam due to medical illness or non-medical reasons, you must consult an academic counsellor to obtain academic accommodation to write a make-up exam.

## **Student Code of Conduct**

The purpose of the Code of Student Conduct is to define the general standard of conduct expected of students registered at The University of Western Ontario, provide examples of behaviour that constitutes a breach of this standard of conduct, provide examples of sanctions that may be imposed, and set out the disciplinary procedures that the University will follow. For more information, visit [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/code\\_of\\_conduct.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/code_of_conduct.pdf).

## **English Proficiency for the Assignment of Grades**

The University policy on English proficiency is available at [http://www.uwo.ca/univsec/pdf/academic\\_policies/exam/english.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/exam/english.pdf).

## **Accommodation for Medical Illness or Non-Medical Absences**

The University recognizes that a student's ability to meet his/her academic responsibilities may, on occasion, be impaired by medical illness. Illness may be acute (short term), or it may be chronic (long term), or chronic with acute episodes. The University further recognizes that medical situations are deeply personal and respects the need for privacy and confidentiality in these matters. However, in order to ensure fairness and consistency for all students, academic accommodation for work representing 10% or more of the student's overall grade in the course shall be granted only in those cases where there is documentation indicating that the student was seriously affected by illness and could not reasonably be expected to meet his/her academic responsibilities.

A UWO Student Medical Certificate (SMC) is required where a student is seeking academic accommodation. This documentation should be obtained at the time of the initial consultation with the physician or walk-in clinic. An SMC can be downloaded under the Medical Documentation heading of the following website: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf). Documentation is required for non-medical absences where the course work missed is more than 10% of the overall grade. Students may contact their Faculty Academic Counselling Office for what documentation is needed.

Whenever possible, students who require academic accommodation should provide notification and documentation in advance of due dates, examinations, etc. Students must follow up with their professors and their Academic Counselling office in a timely manner. Documentation for any request for accommodation shall be submitted, as soon as possible, to the appropriate Academic Counselling Office of the student's Faculty of registration. Health Studies students should contact the School of Health Studies main office (222 HSB).

## **Scholastic Offences**

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following website: [http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf)

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

### Support Services

There are various support services available on campus. These include services offered by the Student Development Centre, Student Health Services, Office of the Registrar, and Office of the Ombudsperson.

Student Development Centre	<a href="http://www.sdc.uwo.ca/">http://www.sdc.uwo.ca/</a>
Student Health Services	<a href="http://www.uwo.ca/health/services/students/index.html">http://www.uwo.ca/health/services/students/index.html</a>
Office of the Registrar	<a href="http://www.registrar.uwo.ca/">http://www.registrar.uwo.ca/</a>
Office of the Ombudsperson	<a href="http://www.uwo.ca/ombuds/">http://www.uwo.ca/ombuds/</a>

### Course Schedule

Week	Date	Lab Topic	Lecture Topic
1	Jan 6	No Lab	Course Overview
2	Jan 13	No Lab	Science (Reading 1)
3	Jan 20	No Lab	Simple Experiment (Reading 2)
4	Jan 27	Exercises Reading 2	Analysis of Variance (Reading 3)
5	Feb 3	Exercises Reading 3	Simple Regression (Reading 4)
6	Feb 10	Online Quiz — Quiz covers readings 1 to 3. No Lab. No Lecture.	
7	Feb 17	Exercises Reading 4	Multiple Regression (Reading 5)
	Feb 24	Reading Week	
8	Mar 3	Exercises Reading 5	Multiple Regression (Reading 5)
9	Mar 10	Exercises Reading 5	Assumptions and General Principles
10	Mar 17	Online Quiz — Quiz covers readings 1 to 5. No Lab. No Lecture.	
11	Mar 24	No Lab	Factorial Designs
12	Mar 31	No Lab	Clinical Judgment & Clinical Expertise
13	Apr 7	No Lab	Course Review