YORK UNIVERSITY

FACULTY OF HEALTH

SCHOOL OF KINESIOLOGY AND HEALTH SCIENCE

HH/KINE 3150 3.0 Analysis of Data in Kinesiology II

Winter 2019

Description

This course focuses on the intermediate statistical analysis of health data. Students will learn a variety of techniques in inferential statistics to compare single and multiple groups, and explore relationships between variables. Computer analysis of data will be introduced in the R software package. Basic mathematical knowledge and computer skills are required for entrance into the course.

Prerequisites KINE 2050 3.0 (Analysis of Data in Kinesiology)
KINE 2049 3.0 (Research Methods in Kinesiology)

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Teaching Assistants Lisa Avery
Octavia Wong

Computer Accounts All students require a Moodle account, and a FAS [File Access Service] account. It is expected that students will check their Moodle accounts **daily**.
http://moodle.yorku.ca

Course Hours

Lectures:
Tuesdays 12:30 PM - 2:30 PM
303 Stong College

Labs:
Tuesdays and Thursdays 125A Chemistry Building
Labs begin the week of January 14, 2019

Lecture Notes will be posted on Moodle prior to class.

Students are expected to print the lecture notes and bring them to class along with a calculator.

Course Learning Objectives:

After completion of KINE 3150 3.0 [Analysis of Data in Kinesiology II], students will understand fundamental statistical concepts and some of their basic applications in Kinesiology and Health Science. Students will be able to:

a) calculate appropriate descriptive statistics for a dataset.

b) apply appropriate methods to perform statistical inference for one and two sample comparisons with continuous and binary data.

c) understand the importance of sample size estimation for experimental design.

d) apply appropriate ANOVA techniques to compare more than two groups for continuous data.

e) understand and interpret correlation and simple regression analyses.

f) recognize the limitations of traditional statistical tools and apply non-parametric statistical methods when statistical assumptions are violated.

g) utilize the R statistical software package to analyze data.

h) effectively communicate statistical results through report writing.

Lab Structure

1. Each lab will begin with a preliminary recorded demonstration of the analysis in R (15 minutes).
2. Students will then be encouraged to try similar problems either alone or in small groups (30-45 minutes).
3. A brief lab quiz (multiple choice questions on Moodle) will conclude the lab (15-30 minutes). Each quiz is based on sample test questions and the lab material. Questions may also be discussed in the lab with the TA.

Course Evaluation

-	Lab Quiz/Participation (optional)[1]	20%	(Online Quiz During Each Lab/Attendance)
-	Data Analysis Project	20%	(**Week of February 11, 2019 during Lab**)
-	Midterm Exam	20%	(**February 26th, 2019)**
-	Lab Exam	20%	(**Week of March 18, 2019 during Lab)**
-	Final Exam (in class)	20%	(**April 2nd, 2019)**

[1] The percentage allocated for any Lab Quiz/Participation not attempted/completed will be added to the Lab Exam. *

Note: All tests are cumulative and cover material from the lectures, labs and assigned readings.

Memory Aid

For the Midterm Test, Lab Exam, and Final Exam you will be allowed to bring one standard letter-size (8.5'' x 11'') **hand-written** double-sided memory aid. Note that photocopying of memory aids, or other means of increasing space are not permitted. I am allowing a memory aid to avoid the need to memorize formulae and reduce anxiety, any memory aid which violates the **spirit of this rule may be confiscated at exam sign-in.**

Make-Up Policy

No permission is ever given to a student to write a test or exam in advance of its scheduled date. **A student who misses a Term Test or Lab Exam will be allowed to write a makeup test during the lab the following week only if: a) the student provides a completed Registrar's Office Attending Physician's Statement showing a physical incapability of writing the test/exam, dated the day of the test/exam or earlier.** Any other forms of doctor's note, particularly one like: "The student was seen in my office" are not acceptable; **or b) on demonstrated compassionate grounds, which is confirmed by supporting documentation (e.g., death certificate). In all other circumstances, you will receive a grade of zero.** Irrespective of the reason, the student must contact the course director within 24 hours of the missed test.

Students who miss the in class Final Exam must formally petition your home Faculty. I will not approve any request for deferred standing. You are responsible for: 1) obtaining the petition from your home Faculty; 2) completing the petition form as specified.

If your Faculty Petitions Committee grants your petition, you will be allowed to write a deferred exam, likely scheduled 1 – 6 months after your petition is submitted. If your petition is denied, you will receive a grade of zero on the final exam.

- Please note that students have 1 week after the posting of test results and answers to contact the course director about marking concerns.

Although numerical marks are assigned to each piece of work in this course there should be no assumption that a total number of marks translates directly to a lettergrade. Lettergrades will be determined by the descriptions in the York University Undergraduate Calendar.

Lecture Topics

1. Introduction to Statistics, Types of Variables, Measures of Central Tendency, Graphs
2. Probability Basics, Random Variables, Binomial and Normal Distribution, Z Scores, Study types
3. T Distribution, Differences Between Means, Paired Differences
4. Analysis of Binary and Categorical Data, Chi-Squared Tests

5. Comparing Multiple Groups, Single Factor ANOVA, Repeated Measures ANOVA
6. Pairwise Comparisons, Factorial ANOVA
7. Correlation, Simple Linear Regression, Multiple Regression, Confounders
8. Regression Diagnostics, Prediction with the Regression Model

In addition, topics covered during the labs will include: 1) the use of computer software (R) to calculate descriptive, inferential and correlation statistics; 2) the presentation and interpretation of data; 3) the design and analysis of simple studies 4) sample size estimation for study design.

Drop Date: The last day to drop this Winter term course without receiving a grade is: **March 8, 2019**.

Lecture Capture:
Lectures will be digitally recorded and posted online. Please note the York University policy regarding this technology.

The York University Student Code of Conduct specifically prohibits theft of intellectual property, which includes recording a course director's lecture without his/her permission or taking lecture material provided on line, modifying it, and/or using it for your own personal use or gain. The material provided is only to be used for your personal study when you take the course for which it was created. Use in any other way will result, at the minimum, in sanctions in accordance with the York Code and, at the maximum, will be breaking federal, provincial or municipal laws and will be acted on accordingly.

IMPORTANT COURSE INFORMATION FOR STUDENTS

All students are expected to familiarize themselves with the following information, available on the Senate Committee on Curriculum & Academic Standards webpage (see Reports, Initiatives, Documents):

http://www.yorku.ca/secretariat/senate_cte_main_pages/ccas.htm

- York's Academic Honesty Policy and Procedures/Academic Integrity Website
- Ethics Review Process for research involving human participants
- Course requirement accommodation for students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities
- Student Conduct Standards
- Religious Observance Accommodation

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Note: The lecture topics and dates are approximate.

Week Beginning	**Wednesday Lecture**	**Laboratory**
January 7	Introduction, Central Tendency, Parameters and Statistics	Labs start week of January 14
January 14	Probability Basics, Normal Distribution, Z Scores, Study Design	Lab 1
January 21	Hypothesis Testing, Confidence Intervals and One Sample Inference	Lab 2
January 28	Two Sample Inference, Unpaired and Paired Data, Non-parametric Statistics	Lab 3
February 4	Analysis of Binary and Categorical Data, Reporting Results	Lab 4
February 11	Research Interests: Clinical Trials and Interobserver Agreement	Lab 5 - **Data Analysis Projects Due**
February 18	**Reading Week (No Classes)**	**No Labs**
February 25	**Midterm Test: February 26th 12:30 PM – 2:00 PM**	**No Labs**
March 4	ANOVA I: One Factor ANOVA, Repeated Measures	Lab 6
March 11	ANOVA II: Pairwise comparisons, Factorial Design	Lab 7
March 18	Regression I: Correlation, Simple and Multiple Regression	**Lab Test**
March 25	Regression II: Residuals, Diagnostics, Confounders	Lab 8
April 1	**Final Exam: April 2nd 12:30 PM – 2:00 PM**	**No Labs**