EPSE 592: Design & Analysis of Experiments
Winter 2019/20 Term 2

Instructor: Ed Kroc
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Office hours: Thursdays, 3:00 - 4:00 PM

Credits and prerequisites:
Credits: 3
Prerequisite: EPSE 482 or equivalent (basically, one course in intro statistics)

Meeting times and locations:
Section 075: Thursday, 4:30 - 7:30 PM, Scarfe 1021

Course webpage:
All course notes and other handouts will be posted on the course webpage accessible from my main webpage:

https://ekroc.weebly.com

Email policy:
Email is the best way to get ahold of me outside of class. I generally respond within 24 hours; however, I will usually *not* respond to messages on weekends and statutory holidays. Thus, if you send me a message Friday evening, don't expect to receive a reply until Monday morning (or until Tuesday morning if Monday is a holiday).

Course overview:
This course will cover all the basics and essentials of experimental design and analysis. These methods have a long history and enjoy broad application in all of the natural and social sciences. We will discuss theory and applications. Mathematical foundations will form a component of the material, though our main focus will be on practical applications for researchers in a variety of disciplines.

Software:
We will use the free platform **Jamovi** for our statistical analyses. Download the software here:

https://www.jamovi.org/

This is an R-based platform, but does *not* require knowledge of how to code in the R language. Jamovi is a "point and click" or "drop-down menu" based platform. However, the software also allows you to easily access and view all R code used to generate analyses and figures of the point-and-click operations, making it an excellent way to learn a bit of R without much of the frustration of diving into a programming language from scratch.

Assessment:

***In-class quizzes: 25%**

- We will start each class (except the first) with a short 2-3 question quiz covering material from the previous week. You will have 10 minutes to complete these quizzes. There will be 12 quizzes total and your individual best 9 scores will be used to calculate this component of your final grade.

***Written homeworks: 50%**

- There will be four written homework assignments throughout the term, one due every three weeks. Each assignment will be worth 12.5% of your final grade. New questions (1-2) that are germane to the material just covered will be added each week. Tentative due dates are as follows:

-Week 4: Jan. 30
-Week 7: Feb. 27
-Week 10: Mar. 19
-Week 12: Apr. 2

***Take-home final exam: 25%**

- The take-home final exam will be comprehensive. The format will be similar to the homework assignments and in-class case study discussions. The exam will be due by 5 PM on Apr. 24.

Tentative schedule of classes:

-Week 1: Course Intro & Basic Stats Review 1: conditional probability
-Week 2: Basic Stats Review 2: random variables, sample statistics, hypothesis testing
-Week 3: Basic Stats Review 3: t-tests, F-tests, Type I/II errors, multiple comparisons
-Week 4: One-way ANOVA
-Week 5: Two-way (n-way) ANOVA, interactions
-Week 6: More on n-way ANOVA, interactions, effect size measures
-Reading Break-
-Week 7: Power analysis; unbalanced designs
-Week 8: Randomized block designs; nested designs
-Week 9: Repeated measures ANOVA
-Week 10: ANCOVA, regression intro
-Week 11: Nonparametrics: Chi-squared, Fisher's exact tests
-Week 12: More on nonparametrics: Mann-Whitney, Wilcoxon signed-rank; Kruskal-Wallis

Recommended textbook(s):

There is ***no*** required textbook for this course. In addition to our course notes, I will post other useful notes on course topics from various open sources.

However, there are several excellent textbooks I would strongly recommend referring to in the library, or purchasing if (1) you find the textbook helpful, and (2) you plan to pursue a career in applied scientific research.

- *Fundamental Concepts in the Design of Experiments,* Charles R. Hicks & Kenneth V. Turner, Jr. This is a superb textbook. It contains most of the relevant mathematics of the subject, but takes a very conversational and example-driven approach throughout.

- *Analysis of Variance Designs*, Glenn Gamst, Lawrence S. Meyers, & A.J. Guarino. A soft textbook written for social scientists. Very light on mathematical details, but many informative examples and case studies.

- *Statistical Methods for Psychology*, David C. Howell. A nice compromise text between the previous two in terms of technical content. An online copy is available (see website).

Academic integrity:

Make sure you are familiar with standard UBC policy. See the below website for more details:

http://www.calendar.ubc.ca/Vancouver/index.cfm?tree=3,54,111,959

Academic honesty is essential to the continued functioning of the University of British Columbia as an institution of higher learning and research. All UBC students are expected to behave as honest and responsible members of an academic community. Breach of those expectations or failure to follow the appropriate policies, principles, rules, and guidelines of the University with respect to academic honesty may result in disciplinary action.

It is the student's obligation to inform himself or herself of the applicable standards for academic honesty. Students must be aware that standards at the University of British Columbia may be different from those in secondary schools or at other institutions. If a student is in any doubt as to the standard of academic honesty in a particular course or assignment, then the student must consult with the instructor as soon as possible, and in no case should a student submit an assignment if the student is not clear on the relevant standard of academic honesty.

If an allegation is made against a student, the Registrar may place the student on academic hold until the President has made his or her final decision. When a student is placed on academic hold, the student is blocked from all activity in the Student Service Centre.