ASEN 5519: Special Topics –   Experimental Design and Statistical Methods
Lecture: T/Th 1:00-2:15pm, AERO 114
First two weeks on Zoom

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Office Hours: Friday 8:30- 9:30am, AERO N301,
(first two weeks on Zoom)

1.   Overview

This 5000 level graduate student course is aimed at examining the applied issues of designing experiments and performing statistical analyses to reach justified scientific conclusions. The approach will rigorously address the mathematical underpinnings of statistical tests and modeling through applied examples. Efficient and appropriate experimental design approaches will be integrated with statistical analysis techniques to enable application to real-world research questions. A special focus will be placed on the unique challenges of human subject experiments. Statistical software (e.g., R) will be used extensively.

A wide range of topics will be covered to provide a "one stop" overview of experimental statistics for the engineer. This includes data visualization, hypothesis formulation, inferential statistics (e.g. t-test), briefly correlation and (multiple) regression, uncertainty and confidence intervals, ANOVA (fixed effects, random effects, and mixed), ANOVA-derived methods (e.g. ANCOVA, Nested designs), post-hoc comparisons and corrections, diagnostics and remedial measures, and best practices for reporting statistics in publication. Approaches and challenges that are common for human subject experiments will receive special attention, including repeated measures (within subjects) designs and analyses, outlier identification, non-parametric techniques, and small N approaches such as Bayesian statistics. Additional topics beyond the scope of the course will be touched upon to provide guidance for self-exploration of areas of interested for individuals' research.

2.   Assessment

Table 1 outlines the material by which student performance will be assessed. The primary evaluation components of the course will be homework and exams. There will also be a semester group project, with teams of up to 3 people performing an experiment with statistical analyses. This course will have 2 exams, but we will not use the time slot

assigned during finals week. Additional details on tim eline and due dates can be found in the course schedule document.

Table 1: Distribution of course assessments

Exams (2)	30%
Homework (5)	50%
Semester Project	20%
	100%

3. Textbook

There is no required textbook for the class. An online version of the primary text, "Applied Linear Statistical Models" by Kutner, Natchtsheim, Neter, and Li, can be found here:

https://mysite.science.uottawa.ca/rkulik/mat3378/mat3378 -textbook.pdf

Readings will be assigned from other resources as needed, and will be announced at least one week in advance of the due date.

4. Distance Students

This course requires the useof the Zoom conferencing tool. To join synchronously, please use the following information:

Join via web browser

If you feel ill and think you might have COVID -19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-19, you should stay home and follow the further guidance of the [Public Health Office](#) (contacttracing@colorado.edu). If you are fully vaccinated and have been in close contact with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the [Public Health Office](#) (contacttracing@colorado.edu).

7. Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability oiod a0 (e o)-1(h)-1 (n)-2 ((o)-4 (u)-8 (r)s̄ǹ t̄ (i)ǎ (t)ǎd()ṕ1e(c)@ụ1o(tu

10. Sexual Misconduct, Discriminati   on, Harassment and/or Related
     Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. The university will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimat e partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by or against members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303 -492-2127 or email cureport@colorado.edu. Information about university policies, reporting options , and the support resources can be found on the OIEC website.

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related ret aliation, to ensure that individuals impacted receive information about their rights, support resources, and reporting options. To learn more about reporting and support options for a variety of concerns, visit Don't Ignore It .

11. Religious Holidays