Colorado State University

STAT511A: Experimental Design and Data Analysis for Researchers I

Fall 2019
Section 001 (Local)
T/Th 2:00 – 3:50 Clark A 206

Instructor Information

Instructor: Dr. Ann Hess
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Office: Statistics 218
Phone: (970) 491-5077 (Note: email preferred)
Office Hours: T/Th 3:50 – 4:30 (Clark A206) or by arrangement

TA/Grader: Ms. Hanxiao Jing
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Office Hours: TBA

Objectives: This course (together with STAT512) is designed to provide an introduction to statistical thinking and statistical methods for graduate researchers. After completing this course, a successful student will be able to:

1. Understand basic statistical concepts and inferential approaches (estimation, hypothesis testing and confidence intervals) and their role in addressing research questions.
2. For a given study and research question, students should be able to:
    a. Identify an appropriate analysis
    b. Check assumptions and provide alternative approaches if assumptions are not met
    c. Use statistical software for graphing and data analysis
    d. Interpret the results and draw conclusions
3. When planning a study, students should be able to:
    a. Calculate power using statistical software
    b. Justify choice of sample size

Prerequisites: Graduate standing plus one undergraduate statistics course (even if it was some time ago) or consent of instructor.

Required Text: Ott and Longnecker, An Introduction to Statistical Methods and Data Analysis, 7th Edition, Duxbury, 2016. ISBN: 9781305269477

Computing: STAT 511A will use R. R is a free software environment for statistical computing and graphics. To install R, go to www.r-project.org, and click on "download R", choose a CRAN mirror, and download R for your platform (binaries for base distribution).

We will also use RStudio, an IDE (integrated development environment). It is a program that makes it more convenient to work in R. Go to the website (www.rstudio.com) and download RStudio. We will use the free Desktop Open Source License.

Data Sets: From the Ott & Longnecker companion site (see Canvas), download the zipped file of datasets. I recommend using the files in CSV format ("ASCII-comma"). Note: The file extension is .TXT even though the files are actually CSV! The files can be imported into R using the read.csv() function:

```
InData <- read.csv("yourfilepath", quote = "'")
```

or

```
InData <- read.csv(file.choose(), quote = "'")
```

The file.choose() function allows files to be chosen interactively (without typing out the file path location). The quote option is used because the column names in the original data are (single) quoted.

Course Web Page at Canvas: You will need your eid and password to log onto Canvas. All course materials are available from Canvas. This will include lecture notes, examples, assignments and other material. *Students are expected to print a copy of the notes and bring them to class*. Note that all lectures will be recorded and available through Canvas. Access the video lectures through the Echo360 tab in Canvas.

Canvas Discussion Board: Students are strongly encouraged to post questions and comments, respond and read the Canvas discussion board. (If your question is of a personal nature, then it is appropriate to email the TA or instructor directly.) The following suggestions will help make efficient use of the discussion board.

1. Please review previous discussions before making a new post.
2. Use the first line of the post to state the topic (**in bold**). Be specific! For example: HW1 **Q2 part C**.
3. If you need help with R code, review the R help document first. When posting, start by showing a summary of any input data using the str() function. Then copy/paste the relevant code and the actual error/warning/output.

Grading:

	Grade Percentage	Tentative Dates
Homework	20 %	Due on Fridays by 4pm
Midterm 1	25 %	Thursday 10/3
Midterm 2	25 %	Thursday 11/7
Final Exam (Take home)	30 %	Due by Wed 12/18 midnight
Total:	**100 %**	

Notes about grades:

1. Withdrawal deadline is Monday 10/21.
2. A weighted average of 80% or better will guarantee at least a B-; 90% will guarantee an A-.
3. STAT 511 is usually curved moderately, but not until the end-of-semester grades.
4. There is no extra credit for the course.

Academic Integrity: This course will adhere to the Academic Integrity Policy of the CSU General Catalog and the Student Conduct Code. On exams, students will sign a statement of the honor pledge "I have not given, received or used any unauthorized assistance."

Exams: Exams are open book, open notes. For the two in-class midterms, no computers or phones allowed. Calculator recommended. For any exam conflicts, please email the instructor at least one week prior to the scheduled exam date. Also see the instructor for exam grading questions.

Homework: Homework will be assigned weekly and typically due on Fridays by 4:00 pm. You are encouraged to work together on homework, but the work turned in should be your own. By that I mean that all the computer output should be generated by you and the answers should be written by you. No late homework will be accepted (without prior approval). Homework can be submitted in pdf format via Canvas or turned in to the grader's mailbox (Statistics 102)**.** Please do not slide work under my office door.

Outline:
1. Terminology and collecting data (Chapters 1-2)
2. Data description and probability distributions (Chapters 3-4*)
3. Inferences about population central values (Chapter 5)
4. Comparing two population central values (Chapter 6)
5. Inferences about population variances (Chapter 7)
6. Inferences about more than two population central values (Chapter 8)
7. Multiple comparisons (Chapter 9)
8. Categorical data analysis (Chapters 10 and 4*)
9. Linear regression and correlation (Chapter 11)
10. Logistic regression and additional topics (Chapter 12*)

*These chapters will be partially covered.

Need Help?

CSU is a community that cares for you. If you are struggling with drugs or alcohol and/or experiencing depression, anxiety, overwhelming stress or thoughts of hurting yourself or others please know there is help available. Counseling Services has trained professionals who can help. Contact 970-491-6053 or go to http://health.colostate.edu. If you are concerned about a friend or peer, tell someone by calling 970-491-1350 to discuss your concerns with a professional who can discreetly connect the distressed individual with the proper resources (http://safety.colostate.edu/tell-someone.aspx). Rams take care of Rams. Reach out and ask for help if you or someone you know is having a difficult time.