Advanced Statistics: Multivariate **Spring 2023**

COURSE SYLLABUS

Course Information

Instructor: Laure Spake
Email: lspake@binghamton.edu
Office Hours: Wednesday 11:00am to 1:00 pm, in S1 219

Course Description

This course is aimed at graduate students in anthropology who will need to analyze the increasingly large and complex datasets collected in our field. The course takes an applied approach to statistics: it prioritizes teaching "how-to" skills over the math that underlies the models. Students will leave this course equipped with the skills needed to perform data management and wrangling, transformations, and statistical modeling. This course is taught using *R*, a statistical computing language. No prior experience with *R* or with programming is necessary, but a basic understanding of statistics is expected.

This is a fast-paced course: you will learn how to write basic scripts in *R*, get familiar with data wrangling techniques, refresh your knowledge of introductory statistics, be introduced modern statistical techniques, and learn about replicability and open science practices – all in 16 short weeks! Please expect to come to every class, to practice at home, and to reach out during office hours if you need extra support. In return for your hard work, you will learn powerful tools that will serve you well in research and industry.

Readings

There is no required textbook to purchase for this course. Assigned readings will be uploaded to or linked from Brightspace.

You will find the following texts useful for supporting you in learning *R*: *R for Data Science,* by Wickham and Grolemund, and *Data Visualization*, by Healy. Both are freely available online, and my copies can be borrowed during office hours, but you can also purchase hard copies if you wish. *R4DS* can be found here: https://r4ds.had.co.nz/ and *Data Visualization* can be found here: https://socviz.co/.

You will find the following text useful for supporting your learning of statistical techniques in addition to *R*: *Discovering Statistics in R* by Field, Miles, and Field. This is on reserve in the library and I strongly suggest using it.

Course resources

Because the course relies on *R*, we will do most of our work on *Posit Cloud,* where you will receive learning exercises and assignments. Lecture slides will be uploaded to Brightspace.

Learning Assessments

Assignments 30%

Students will complete 6 assignments that will be due throughout the term. These assignments reinforce the concepts and skills learned throughout the semester.

Quiz 20%

Students will complete one quiz during the course of the term. This quiz will evaluate comprehension of core concepts in statistics as conveyed in the course.

Term Project 50%

Students will write a report in which they analyze real data. Students will be asked to formulate a research question, select and perform statistical tests, and report results. At the end of the term, they will present their results in a "lightning talk"

Course Schedule

Course topics are below.

Week	Dates	Topic	Due
1	Jan 18	Course Introduction Getting Started with R	-
2	Jan 25	Basics of R Data Visualization	-
3	Feb 1	Data Management and Cleaning	Assignment 1
4	Feb 8	Comparing Groups	-
5	Feb 15	Relationships Between Variables I	Assignment 2
6	Feb 22	Relationships Between Variables II	-
7	Mar 1	Directed Acyclic Graphs	Assignment 3

8	Mar 8	Generalized Linear Models	Assignment 4
9	Mar 15	Hierarchical Models	-
10	Mar 22	Dimensionality Reduction	Assignment 5
11	Mar 29	Quiz and Review	Quiz
12	April 5	No Class – Spring Break	-
13	April 12	Student-proposed topic	-
14	April 19	Student-proposed topic	Assignment 6
15	April 26	p-values and Alternatives Power Calculations	-
16	May 3	Project Presentations	Term Project

Course Policies

University policies on academic integrity, accommodations for students with disabilities, and other accommodations apply. If you need help accessing accommodations, please contact me within the first two weeks of the term.

Work submitted late without prior arrangements will be penalized 10% per day. Please get in touch with the instructor ahead of time if your assignments will be late for any reason.

Students needing help should contact the instructor and/or the TA as early as possible. Do not wait until the last minute to ask for help: please make use of office hours as needed throughout the semester.