Introduction to Statistical Computing - STAT 445/645

Fall 2018—DMSC 106—Mon,Wed 2:30pm - 3:45pm

Instructor:	A. Grant Schissler	**Contact**:	aschissler@unr.edu, 775-784-4661 (office)
Office:	DMSC 224	**Hours**:	Tue 2:30pm-3:30pm, Wed 1:30pm-2:30pm, or by appointment

Catalog Description

Introduction to statistical computing; data visualization and manipulation; document creation; graphics; simulation techniques; parallel computing; estimation; optimization; advanced statistical methods.

400-level Student Learning Outcomes

UG1 Students will be able to implement statistical simulation, re-sampling techniques, and maximum likelihood estimation.

UG2 Students will be able to conduct a simulation-based power analysis.

UG3 Students will be able to write professional quality reports and computer code.

GRAD1 Students will be able to use statistical computing methods to complete a research project and effectively communicate their findings.

Course outcomes

Students will be able to ...

1. use R and RStudio.
2. understand the basics of git.
3. produce HTML, PDF, or Word documents using R Markdown.
4. install R packages for computing tasks.
5. use R vectors.
6. use R factors.
7. use R lists.
8. use DATA.FRAMES.
9. understand control flow in R.
10. iterate using loops in R.
11. iterate using the APPLY family.
12. manipulate numeric and text data using base R utilities.
13. write functions in R.
14. benchmark/profile R code.

15. write parallel R code.
16. import data from flat files, including .csv, .txt, .xlsx.
17. clean data for data analysis.
18. conduct an exploratory data analysis.
19. visualize data.
20. understand/implement the graphic of graphics.
21. generate pseudo-random numbers.
22. simulate data via Monte Carlo techniques.
23. conduct simulation-based hypothesis tests.
24. conduct a simulation-based power analysis.
25. integrate functions using Monte Carlo techniques.
26. use re-sampling for statistical inference (bootstrap, jackknife).
27. use maximum likelihood estimation for statistical inference.
28. use Markov Chain Monte Carlo (MCMC) to sample from probability distributions.