Introduction to Statistical Computing - STAT 445/645

Fall 2019—DMSC 106—Mon,Wed 2:30pm - 3:45pm

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Office:	DMSC 224	**Hours**:	Tue/Wed 4-5pm, 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 to perform basic coding tasks (e.g., data structures, flow, iteration, functions).
2. use R Markdown to produce high quality, reproducible documentation of data analyses.
3. use R to import and clean data.
4. use R to conduct an exploratory data analysis, numerically and visually.
5. use R to conduct simulation (Monte Carlo) studies (e.g. error rates, power analyses, integration).
6. use R to perform statistical inference, such as
    - Maximum Likelihood Estimation (MLE)
    - Randomization/Permutation tests
    - Bootstrap (re-sampling)
    - Markov Chain Monte Carlo (MCMC)
7. apply computational statistics to real world data.