Methods of Statistical Computing

Instructor: Dr. Hongxiao Zhu
Office: Hutcheson Hall 403H
Email: hongxiao@vt.edu
https://hongxiaozhu.github.io/

Time: Tuesday and Thursday 12:30 PM–1:45 PM

Location: Smyth 232

Office hour: By appointment

Canvas site: This course has a canvas site through Virginia Tech's Canvas system (http://canvas.vt.edu). All course materials will be posted on canvas site. Homework will be collected and graded through canvas.

Course description: This course helps develop necessary R programming skills for statistical computing, and introduces computation-intensive statistical approaches and modern machine learning methods. Materials covered include:

1. R-computing and programming
2. Data scraping and text mining
3. Random number simulations
4. Other numerical simulations (e.g., Brownian motion, discrete Markov chains, behavior of statistical estimators).
5. Monte Carlo integration
6. Bootstrap
7. Optimization
8. Supervised/unsupervised learning
9. Network data analysis
10. Neural networks

Prerequisites: Math 2114 and Stat 3006 and Stat 3104 (or CMDA 2006)

Textbook: There is no textbook required. Students are recommended to refer to the following book for R programming: *Introduction to Scientific Programming and Simulation Using R*, by Owen Jones, Robert Maillardet and Andrew Robinson, 2014, CRC Press, Taylor & Francis Group.

Software: R and R studio.

Hardware: Most in-class exercise and homework problems need to use a computer. Students are required to bring a laptop to each lecture.

Grading:

Homework: 50%
Midterm exam (in class, open book, need a computer): 20%
Final project: 20%
Class attendance: 10%. **Attendance will be recorded for every lecture.**
Bonus credits: 3% (The bonus questions are optional. They will be assigned during homework).

Grade calculation: homework, midterm, final projects, and class attendance add up to 100%. Scores are first scaled to percentages and then weighted using the corresponding weights in percentages. Bous scores will be scaled to percentages

and added directly to the final grade. For example, a student gets 80% on the final grade and receive 70% of the bonus points, his/her final grade (in percentage) will be 80%+0.7*3%=82.1%.

Class attendance: Class attendance is required unless there are medical conditions or other reasonable obligations. If you have a medical condition or an obligation that will result in missing a class, let me know ahead of time.

Course materials: The canvas site will be used to post class materials and collect/grade homework and exams.

Homework policy: A due date is shown on each homework assignment. Late homework is only accepted when it is submitted no later than three days after the deadline. Late homework is subject to an extra deduction of 20% per late day.

Honor code: The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states: "*As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do.*" Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code. For additional information about the Honor Code, please visit: www.honorsystem.vt.edu.

The Virginia Tech honor pledge for assignments is as follows: "*I have neither given nor received unauthorized assistance on this assignment.*" The pledge is to be written out on all graded assignments at the university and signed by the student. The honor pledge represents both an expression of the student's support of the honor code and an unambiguous acknowledgment that the student has, on the assignment in question, abided by the obligation that the Honor Code entails. In the absence of a written honor pledge, the Honor Code still applies to an assignment.

Diversity and inclusion: Virginia Tech strive to inspire and nurture all in our community - understanding that each person brings distinct life experiences to the research and education. For statement of diversity and inclusion of Department of Statistics, please refer to https://www.stat.vt.edu/about/Diversity.html