STA 4102 Computational Methods in Statistics I

Florida State University, Fall 2025

Instructor: Michael Jauch

1 Home Page

All course materials can be found on Canvas: `https://canvas.fsu.edu`

2 Class Location and Times

Location: OSB 0108
Times: MWF 12:00PM - 12:50PM

3 People

Instructor: Michael Jauch
Office Hours: Mon. 1PM - 2PM in OSB 0411
Email: mjauch@fsu.edu
Website: https://michaeljauch.github.io/

Teaching Assistant: Yuhui Wang
Office Hours: Thurs. 10AM - 11AM in OSB 322
Email: ywang38@fsu.edu

4 Email

Should include 4201 in the email subject line. Emails that do not contain 4201 will likely be missed.

5 Course Objectives

Through this course, students should develop

- an appreciation of the centrality of computing in modern statistics;
- an understanding of the major computational problems that arise in statistics (especially those described in the course overview);
- knowledge of algorithms that can be used to solve these problems;
- the ability to implement these algorithms in the `R` programming language;
- proficiency in communicating computational ideas.

6 Textbooks

Our main textbook will be

- Givens and Hoeting (2012), Computational Statistics, 2nd Ed.

which is available for free online through the FSU library. This text is not written with undergraduates in mind, so do not feel discouraged if you have trouble reading through it. I will be selective about what material we cover and conscious to choose the right level of depth.

7 Course overview

The course will include the following modules:

- Introduction to R, RStudio, and R Markdown
- Optimization and Solving Nonlinear Equations
- Numerical Integration
- Simulation and Monte Carlo Integration
- Bootstrapping (potentially)

8 Grading policy

Course grades will be computed with the following weights:

Homework (lowest dropped)	55%
Quizzes (lowest dropped)	30%
Project	15%

Homeworks

There will be one or two homework assignments per module. I will drop the lowest homework grade. Homework that is less than a day late will receive 80% of the credit it would have received if turned in on time. Homework that is more than a day late will receive 60% credit, provided that the grader has not already finished grading that assignment. Please reach out to me if there are special circumstances which have prevented you from finishing the homework on time.

Students may work together on homework, but each student must write up the homework independently, in their own words, and submit it separately. Students should list any other students they worked with on homework and must cite any references, **including websites and AI tools**, they relied upon. Code should be thoroughly commented, and each students' comments should reflect their own understanding. Comments must not be copied and pasted from another student.

Completed homeworks must be submitted online via Canvas. Students should use `R` Markdown for problems that require use of `R` and submit an HTML or PDF file. All relevant code must be included.

Quizzes

We will have at least one scheduled in-class quiz for each module. They should take approximately 15 minutes and must be completed independently. I will drop the lowest quiz grade. Let me know ahead of time if you must miss a quiz.

The purpose of the quizzes is to motivate students to engage with the course material on a regular basis, beyond the specific task required for homework. The quizzes will tend to focus on big picture questions that can be answered quickly if one has been following along rather than "gotcha" questions or involved calculations.

Project

Individually or in small groups, students will complete a project which either 1) explores a course topic in greater depth or 2) investigates a new topic. Unlike the homework assignments, the project will involve a formal written report or presentation. You will have roughly three weeks to complete the project. More detailed directions will be provided toward the end of the semester.

9 Computing and Typesetting

This course will use `R` for all computing: http://cran.r-project.org Students are encouraged to typeset assignments using `R` Markdown: http://rmarkdown.rstudio.com `R` Markdown is easily used from within RStudio: https://www.rstudio.com/products/rstudio

10 Prerequisites

Students will get the most out of the course if they have basic knowledge of probability and statistics (e.g. probability density functions, expected values, and maximum likelihood estimation), some familiarity with multivariable calculus (e.g. gradient and critical points of a function), comfort with matrix algebra, and experience with a programming language (e.g. `R`, Matlab, or Python).

University Attendance Policy

Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid written excuse. Consideration will also be given to students whose dependent children experience serious illness.

Academic Honor Policy

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at http://fda.fsu.edu/Academics/Academic-Honor-Policy

Academic Success

Your academic success is a top priority for Florida State University. University resources to help you succeed include tutoring centers, computer labs, counseling and health services, and services for designated groups, such as veterans and students with disabilities. The following information is not exhaustive, so please check with your advisor or the Department of Student Support and Transitions to learn more.

Americans With Disabilities Act

Students with disabilities needing academic accommodation should: (1) register with and provide documentation to the Office of Accessibility Services; and (2) request a letter from the Office of Accessibility Services to be sent to the instructor indicating the need for accommodation and what type; and (3) meet (in person, via phone, email, skype, zoom, etc...) with each instructor to whom a letter of accommodation was sent to review approved accommodations. This syllabus and other class materials are available in alternative format upon request. For the latest version of this statement and more information about services available to FSU students with disabilities, contact the:

Office of Accessibility Services
874 Traditions Way
108 Student Services Building
Florida State University Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
oas@fsu.edu
https://dsst.fsu.edu/oas

Confidential campus resources

Various centers and programs are available to assist students with navigating stressors that might impact academic success. These include the following:

Victim Advocate Program University Center A, Room 4100, (850) 644-7161, Available 24/7/365, Office Hours: M-F 8-5 https://dsst.fsu.edu/vap	Counseling & Psychological Services Askew Student Life Center, 2ndFloor, 942 Learning Way (850) 644-8255 https://counseling.fsu.edu/	University Health Services Health and Wellness Center (850) 644-6230 https://uhs.fsu.edu/