STAT 433 Statistical Computing

Fall 2020

Instructor: Dr. Seungchul Baek
Class Time/Place: 2:30-3:45pm MW via WebEx
Office Hours: 1:00-2:00pm MW via WebEx or by appointment
Email: baek@umbc.edu
Course website: http://baek.math.umbc.edu/stat433f20.html/

Textbook:

Owen Jones, Robert Maillardet, and Andrew Robinson (2014). *Introduction to Scientific Programming and Simulation Using R*, 2nd Edition. Chapman & Hall/CRC The R Series.
Maria L. Rizzo (2019). *Statisical Computing with R*, 2nd Edition. Chapman & Hall/CRC The R Series.
The above textbooks are not required. I will provide lecture notes and handouts in the course website.

Course Overview:

This course is an introduction to statistical computing at the undergraduate level. Applications rather than theory will be emphasized. We will discuss the following topics:

- *R Programming:* Basics in R; functions; data structures; graphics
- *Review:* Some statistics background
- *Numerical Methods:* Root-finding algorithms; numerical integration; optimization
- *Monte Carlo Methods:* Random number generation; Monte Carlo integration; Monte Carlo simulation; statistical inference; variance reduction techniques
- *Bootstrap and Jackknife:* Bootstrap; Jackknife; Bootstrap confidence interval.

Prerequisite:

A good background for probability and statistics is desirable, e.g., a grade of "C" or higher for STAT 355 or STAT 451-453. If you are familiar with R, it is good, but not necessarily.

Grade Breakdown:

Your course grade will be determined by your performance on homework (35 percent), the quizzes (10 percent), the midterm (25 percent) and the final exam (30 percent).
Final course grades will be assigned according to the following protocol: A=[90,100), B=[80,90), C=[70,80), D=[60,70), and F=[0,60).

Homework:
The homework assignments are an important part of this course and are weighed heavily. Homework must be submitted with a careful and concise write-up of the results (including any necessary mathematical derivations, a description of an algorithm, numerical output organized neatly into a table or graph, and analysis/interpretation of numerical results). Any necessary R codes should also be attached, however, a solution to a problem that consists of only R code and output will receive no credit. **Late homework will NOT be accepted.**
Working together on homework assignments is permitted and encouraged. However, each student must write up his/her solutions independently of others. Copying someone else's work is not tolerated. If it happens, both parties will receive a 0 for the assignment as well as being reported to the University Academic Integrity Committee.

Quizzes:
There will be quizzes that will start randomly during a class. All questions in quizzes are based on lecture materials or homework questions or similar contents. Your lowest quiz grade will be dropped.

Exams:
We will have midterm exam, which will be take-home. We will have an in-class final examination on **Friday, December 11 at 1:00pm**. Final exam is open-book and open-notes. For final exam, you must join virtual classroom via WebEx and turn on your camera so that the instructor can see you during the exam.

- Midterm **Due: 4:00pm Wednesday, October 28**.
  Will be posted: Monday, October 26 (tentative).
- Final: **1:00-3:00pm Friday, December 11**.

Please note that I do not give make-up examinations unless your absence is due to a university function or emergency case, you have given me appropriate documentation, and you have discussed it with me at least one week in advance.

Computing:
We will use R, one of the standard statistical software, throughout this course. The R package is available for free at http://www.r-project.org. The "An Introduction to R" manual available at this site is an excellent resource, at http://cran.r-project.org/doc/manuals/r-release/R-intro.pdf.

Recommended Study Habits:

- Attend every class and be on time although we are meeting virtually.

- Ask questions if you do not understand something or wish to know more.
- Check email often for announcements.
- Form small study groups to work on homework and to prepare for the exams/quizzes.
- Email me as soon as possible if you have any questions.
- Make it your goal to understand everything we do.

Academic Integrity in the Online Instruction Environment:
Academic integrity is an important value at UMBC. By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. These principles and policies apply in both face-to-face and online classes. Resources for students about academic integrity at UMBC are available at https://academicconduct.umbc.edu/resources-for-students/.

Accessibility and Disability Accommodations, Guidance and Resources:
Support services for students with disabilities are provided for all students qualified under the Americans with Disabilities Act (ADA & ADAAA) and Section 504 of the Rehabilitation Act who request and are eligible for accommodations. The Office of Student Disability Services (SDS) is the UMBC department designated to coordinate accommodations that would create equal access for students when barriers to participation exist in University courses, programs, or activities.

If you have a documented disability and need to request academic accommodations in your courses, please refer to the SDS website at http://sds.umbc.edu for registration information and office procedures.

SDS email: disAbility@umbc.edu
SDS phone: (410) 455-2459

If you will be using SDS approved accommodations in this class, please contact me (instructor) to discuss implementation of the accommodations. During remote instruction requirements due to COVID, communication and flexibility will be essential for success.

Official UMBC Title IX Guidance: (link)