STAT 406: Introduction to Statistical Computing (Fall 2016)

- **Web site**: Canvas.
- **Instructor**: Yves Atchadé
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  E-mail: yvesa@umich.edu Office Hours: Mo. 4-5pm, Tues. 3-4pm.
- **Prerequistes**: (Stat 401 and Math 215), or (Stat 403 and Math 215) or Stat 412 or Math/Stat 425 or equivalent.
- **Lectures**: Mo-Wed.: 10-11:30am, 260 WEISER.
- **Labs and GSIs**: There will be lab sessions to help the students further practice the concepts introduced in class. Due to the class size three lab. sessions are currently scheduled. The lab sessions are directed by the GSIs, who will also hold office hours to provide further help for learning. All the labs are held on **Thursday in B760 EH**. The GSI office hours are held in Room SLC 1720.
  - Lab 1 (8:30-10am): Boang Liu (boangliu@umich.edu). OH: TBD.
  - Lab 2 (11:30-1pm): Zheng Gao (gaozheng@umich.edu). OH: TBD.
- **Description**: This course is an introduction to

  a. the statistical software R and to computer programming using R,

  b. some of the basic computational ideas needed in modern Statistics (numerical linear algebra, Monte Carlo methods, bootstrap, optimization methods), with application to core statistical methods such as maximum likelihood, regression models, Bayesian data analysis,

  c. to some of the data technologies needed to deal with the various formats in which data sets are routinely produced (relational databases, XML, regular expressions).

  Prior experience with R or other programming languages is not required. The students are expected to adhere to the programming style and guidelines that will be provided in class.
- **Textbook**: There is no mandatory textbook. However the following books are suggested
  - *Statistical computing with R*, by Maria Rizzo, 2007 Chapman & Hall.
  - *Data science in R: a case studies approach to computational reasoning and problem solving*. by D. Nolan, and D. Temple Lang. 2015, CRC Press.
  - *R programming for bioinformatics*, Robert Gentleman, 2009 Chapman & Hall.
- **Assessment**: The final grades will be based on homework (35%), a mid-term exam (30%) and a final exam (35%).

  Homework. Problem sets will be given regularly during in the semester. Depending on the topic, the problems will be a varying mix of R code writing and more theoretical/statistical analysis. Some important points to keep in mind about the HWs.
  - The HWs are individual. Collaboration between students on the HWs is not permitted beyond general discussions of the problems.
  - Unless instructed otherwise, the HWs are due at the beginning of your respective labs.
  - In submitting your homework, submit your R code electronically on canvas, and hand in a **hard copy of the code together with any additional material** at the beginning of your lab class. DO NOT SEND your assignment directly to me or your GSI.
  - Some of the HWs may have bonus questions. The bonus questions are optional, and carry no credit. Their main purpose is to help you advance your technical skills.
  - Late homework submission may not be accepted.

The mid-term exam. The mid-term exam is scheduled on October 24th, during our regular lecture time. The exam is a closed book exam that test a. your ability to read and correctly construct basic R programs, and your understanding of the algorithms studied in the class so far. Some practice problems will be available before the exam.

Final Exam. The final exam is scheduled on Tuesday, December 20, from 10:30 am to 12:30 pm. The room will be announced later. The exam is a closed book exam that tests a. your ability to read and correctly construct R programs similar to those written in class and in the homeworks throughout the semester b. your understanding of the algorithms studied throughout the semester, and c. your understanding of the data tools studied in the class. Practice problems for the exam will be available before the exam.

- **On emails**: the email is a great mean of communication and I encourage you to use it to reach me and the GSIs. We will typically answer emails within one working day. However, on homework related questions, please limit your email use to quick and easy to answer questions. As a general rule, we do not take long or complicated (conceptually, or notation-wise) questions by email.