

# STA 601: Bayesian Methods and Modern Statistics

## Duke University, Fall 2019

*Instructor:* Alexander Volfovsky, Assistant Professor, Dept of Statistical Science, alexander.volfovsky@duke.edu

*Course Time:* T/Th: 10:05 am - 11:20 am

*Lead TA:* Jordan Bryan

*Course webpage:* Sakai

*For course questions:* Piazza

*For grading questions:* For Homework: TA, Lead TA, then Instructor, everything else Instructor.

Bayesian methods are an increasingly important tools in both industry and academia. We will start by understanding the basics of Bayesian methods and inference, what this is and how why it's important. This course is an introduction to Bayesian theory and methods, emphasizing both conceptual foundations and implementation. We will introduce the essential distinctions between classical and Bayesian methods and discuss the origins of Bayesian inference. After exploring the convenience of conjugate families of distributions, we will cover problems when the posterior is intractable.

*Prerequisites* You are expected to have all pre-reqs to be in the course. Students are expected to be very familiar with R and are **encouraged** to have learned LaTeX or a Markdown language by the end of the course.

Course Sakai website: <https://sakai.duke.edu>

Required Textbook: *A First Course in Bayesian Statistical Methods*, Peter D. Hoff, 2009, New York: Springer. (Available online from the library.)

### *Grading Policy:*

Homework, labs and discussion (expect one per week)	20%
Quiz I (in class):	12.5%
Midterm (in class):	25%
Quiz II (in class):	12.5%
Final Exam (in class?):	30%

Homeworks will be given on a weekly basis. They will be based on both lecture and lab.

**Midterm grades** You will be given a midterm grade assessing your overall performance so far. If you are an undergraduate, this will also be sent to the registrar. This does not go on your transcript. The main purpose of this is to let you know how you are doing in the class.

*Course Policies:* Homework assignments will be announced every Thursday – please check the website! Your solutions to mathematical exercises can be typed or handwritten, but must be clear and legible, otherwise no credit can be given. For programming exercises, include your source code (typed) as well as any supporting derivations, written out separately from the code. You are required to use R for all programming assignments.

The grades are split in the following way: 20% homework, lab, discussion, 25% quizzes, 25% midterm, 30% final exam. Since there are no makeup exams: if you miss any of the quizzes or midterm, your grade will depend more on the final exam score. You cannot miss the final exam.

**All homeworks must be submitted by the beginning of class on Sakai on the day they are due (usually Thursdays). You must submit all of the code as well.**

**Homework solutions** will be curated from *student solutions* with proper attribution. Every week the TAs will select a representative correct solution for the assigned problems and put them together into one solutions set with each answer being attributed to the student who wrote it. **If you would like to OPT OUT of having your homework solutions used for the class solutions, please let the Instructor and Lead TA know in advance.**

Please note that any work that is not legible by the instructor or TA's will not be graded (so given a grade of 0). Every write up must be clearly written in full sentences and clear English. Any assignment that is completely unclear to the instructors and/or TA's, may result in a grade of a 0.

**Your lowest homework grade will be dropped. Please note that the grading scale in Sakai is NOT the same as the grading scale for the course when it calculates your grade. Since the lowest homework grade will be dropped, no late homeworks will be accepted.**

*Missing class/exams/work:* You are responsible for everything from lecture, mentioned in class and lab, and in the Hoff book. You will be expected to follow along the Hoff book as we go along in lecture.

Students who miss graded work due to a scheduled varsity trip, religious holiday or short-term illness should fill out an online NOVAP, religious observance notification or short-term illness notification form respectively. If you are faced with a personal or family emergency or a long-range or chronic health condition that interferes with your ability to attend or complete classes, you should contact your academic dean's office. See more information on policies surrounding these conditions at <http://trinity.duke.edu/undergraduate/academic-policies>. Also, your academic dean can provide more information as well.

All work turned in for a grade must be entirely your own. This particularly relates to homework. You are encouraged to talk to each other regarding homework problems or to the instructor/TA, however the write up, solution, and code *must* be entirely your own solution and work.

*Academic Honesty:* Duke University is a community dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Citizens of this community commit to reflect upon and uphold these principles in all academic and non-academic endeavors, and to protect and promote a culture of integrity. Cheating on exams and quizzes, plagiarism on homework assignments, projects, and code, lying about an illness or absence and other forms of academic dishonesty are a breach of trust with classmates and faculty, violate the

Duke Community Standard, and will not be tolerated. Such incidences will result in a 0 grade for all parties involved as well as being reported to the University Judicial Board. Additionally, there may be penalties to your final class grade. Please review Duke's Standards of Conduct. For more information on the Duke honor code (known as Duke Community Standard), please go to <http://integrity.duke.edu/faq/faq1.html>.

*Students with Disabilities:* Students who require special accommodations in class or during exams should follow the procedures outlined by the Disability Management Program <http://access.duke.edu/students>. Students with disabilities who believe they may need accommodations in this class are encouraged to contact the Student Disability Access Office at (919) 668-1267 as soon as possible to better ensure that such accommodations can be made.

*Privacy Policies:* Student records are confidential.