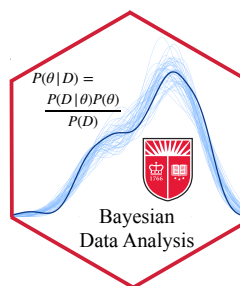


SYLLABUS
Bayesian Data Analysis
Statistics 365, Section 01
Fall 2020



“[A]s for me, I am tormented with an everlasting itch for things remote.”
Herman Melville, *Moby Dick*

Steve Buyske (Buyske rhymes with “nice key”)
buyske@stat.rutgers.edu (Please include “365” in the subject line)

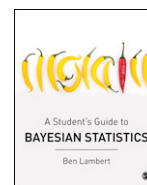
Please try Piazza, via the link in Canvas, for your questions rather than email. The direct link to Piazza is
piazza.com/rutgers/fall2020/0196036501bayesiandataanlys/home

Canvas: <https://rutgers.instructure.com/courses/68767>

Office Hours: Monday 10 am to 11 am ET,
Wednesday 8 pm to 9 pm ET,
Friday 4 pm to 5 pm ET,
and by arrangement (email me for a time).

Join office hours by using the Zoom link on the Canvas course site.

Required Text: *A Student’s Guide to Bayesian Statistics*,
Ben Lambert. Sage Publishing. 9781473916364



Secondary Text: *Probability and Bayesian Modeling* is a more traditionally organized text, and is freely available at
<https://bayesball.github.io/BOOK/>

Prerequisites:

Level II Statistics: 01:960:212 or 01:960:384 or 01:960:401
Calculus II: 01:640:152

We will be using the free R software and RStudio Cloud. No prior experience is required. As long as you have a web browser, no software installation is required.

This is an asynchronous remote course. The class does not have specific meeting times, and there is no time at which you must be logged in. Asynchronous remote courses still require the same number of hours per week as more traditional course formats and meet the same learning goals. The course **is not self-paced**.

The basic plan of the course is that each week there will be new videos, reading, and homework. Homework will not be collected or graded—ask questions about it on Piazza (in Canvas) or office hours. There will be a weekly quiz. There will also be small assignments, often embedded in the videos. There are no exams or course projects.

There will be a quiz every week, plus one quiz during finals. **Unless otherwise announced, the weekly quiz will take place in a 24-hour window starting at noon ET on each Monday.** The format of the quiz will vary from week to week and the content of the quiz is cumulative. All quizzes will have the same point value. Your two worst scores will be downweighted to half the weight of a usual quiz.

Final Grade Based on the Following

Weekly Quizzes	80%
Weekly small assignments	20%

Up to an additional 5 points can be earned via active participation on Piazza (you can post question in Piazza anonymously, but you can only get extra credit for non-anonymous posts and replies).

Pandemic and other crises

None of us can be expected to be doing better than okay. If you tell me you are having trouble, I am not going to judge you or think less of you.

As mentioned above, there are no exams in this course and I will downweight your two worst quizzes. Furthermore, everyone can turn in two assignments and complete two quizzes late (48 hours) with no explanation at all. I hope this will take care of most issues. If you need help navigating resources at Rutgers, I can probably help you. If you need extra help, or need more time on a quiz or assignment, just ask and I will work with you.

Academic Integrity

Cheating undercuts the whole enterprise of education, academics, and science. If I were to cheat in my own work it would end my career. I take cheating very seriously and do not hesitate to refer cases to the Office of Student Conduct. Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.

The university's policy on Academic Integrity is available at <https://nbprovost.rutgers.edu/academic-integrity-students>

Students will be required to certify the following for each quiz: *On my honor, I have neither received nor given any unauthorized assistance on this quiz.*

The following is a rough guide to our topics, but we will adapt it as circumstances require.

Introduction
Bayes rule
Analytic approach
Markov chain Monte Carlo; the Metropolis algorithm
Introduction to R and RStudio
The linear model
MCMC diagnostics
Multiple linear regression
Hierarchical linear regression
Generalized linear models
More on R
Model evaluation
Priors
Bayesian decision theory
Review



Learning Goals

Students successfully completing this course should be able to:

- Explain the Bayesian framework for data analysis.
- Develop, describe, and implement both single parameter and hierarchical models in the Bayesian framework.
- Show high level interpretation of the results of a Bayesian analysis.
- Perform Bayesian computation using Markov chain Monte Carlo methods using R and other software tools

Relevant Student Services:

Please visit the Rutgers Student Tech Guide, <https://it.rutgers.edu/technology-guide/students/>, for resources available to all students. If you do not have the appropriate technology for financial reasons, please email Dean of Students deanofstudents@echo.rutgers.edu for assistance. If you are facing other financial hardships, please visit the Office of Financial Aid at <https://financialaid.rutgers.edu/>.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 17 Senior Street, New Brunswick, NJ 08901

<http://health.rutgers.edu/medical-counseling-services/counseling/>

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 3 Bartlett Street, New Brunswick, NJ 08901 <http://www.vpva.rutgers.edu/>

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation:

<https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.