PSTAT 115: Introduction to Bayesian Data Analysis

Fall 2022

Instructor:	Rodrigo Targino	**Time:**	T/R 8:00-9:15
Email:	rodrigotargino@ucsb.edu		

Course Pages:

- Location: HSSB 1174
- Gauchospace: link
- Nectir: link. We ask that when you have a question about the class that might be relevant to other students, post it on Nectir instead of emailing us. That way, all the staff can be on the same page and everyone can benefit from the response. Click on the Nectir link on Gaucho to be automatically added to the class channel. If you don't have an account already, to please make one at ucsb.nectir.io.
- JupyterHub: link. All your work should be completed here.
- GradeScope: link. Weekly homework assignments are a required part of the course. You are allowed to work with one partner. When submiting to GradeScope, you must include your partners name (link the submission), so that you both get full credit!
- Use this link to sync new assignments and labs.
  - Bookmark this link, you will use it a lot!

Office Hours:
Professor Targino rodrigotargino@ucsb.edu: Office Hours, Fridays 3-4pm
Lauren Hughes [TA] laurenhughes@ucsb.edu: Office Hours, Mondays 10-11am
Yaqiao (Darcy) Wang [TA] darcywang@ucsb.edu: Office Hours, Wednesdays 2:30 - 4:30pm
Cyril Wang [ULA] cyrilwang@ucsb.edu: Office Hours (on Zoom), Tuesdays 10am-12pm; Thursdays 10am-12pm https://ucsb.zoom.us/j/9306692287

Course Texts

- **Required:** Alicia A. Johnson, Miles Q. Ott, Mine Dogucu *Bayes Rules* https://www.bayesrulesbook.com/
- Optional: Peter Hoff *A First Course in Bayesian Statistical Methods*; https://www.springer.com/us/book/9780387922997).
- Optional: Jim Albert *Bayesian Computation with R*; https://www.springer.com/us/book/9780387922973).
- Optional: Richard McElreath *Statistical Rethinking*; https://xcelab.net/rm/statistical-rethinking/).
- Optional: Andrew Gelman, John Carlin et al. *Bayesian Data Analysis*; http://www.stat.columbia.edu/~gelman/book/).

Objectives:

At the end of the course, a successful student will be able to:

- build and refine statistical models using the Bayesian paradigm
- utilize Monte Carlo methods for statistical inference

Prerequisites: PSTAT 120 A-B (probability and math-stat) and 126 (regression). Familiarity with R is required.

Tentative Course Topics:

- Review of frequentist inference
- One parameter models
- Monte Carlo computation
- The normal model
- Markov chain Monte Carlo
- Hierarchical models
- An introduction to probabilistic programming

Grading Policy:

- Homework (35%).
  - There will be approximately 6 homeworks, due roughly every week on Sundays at midnight.
  - You are allowed to work with a partner. You need only turn in one homework per pair. Homework solutions must be done in RMarkdown and turned in on Gradescope. Each homework assignment will be given as a template that you should work from.
  - All code must be written to be reproducible in Rmarkdown
  - All derivations can be done in any format of your choosing (latex, written by hand) but must be legible and *must be incorporated into your final pdf.*
  - All files must be zipped together and submitted to Gradescope
  - Ask a TA *early* if you have problems regarding submissions.
  - Homework not submitted online before the deadline will be considered late (10 point deduction). 24 hours after the deadline homework will not be accepted and no credit will be awarded. Do not wait until the night before it is due to start working!
- Midterm exam (20%). **Take home, due October 27, 2022** .
- Quizzes + Participation (15%)
  - Approximately 5 in quizzes (online), lowest dropped
  - There is no make-up for missed quizzes.
  - Section attendance is required and essential. Your attendance will be noted.
- Final exam (30%). **Take home, due Monday December 8, 2022**

Homeworks:

- All files will be submitted electronically via Gradescope
- Submit a zip file containing:
  1. R markdown code (.Rmd file, template provided)
  2. Any additional files as needed
  3. Generated PDF file

Important Dates:

Midterm	October 27, 2022 (take home)
Final Exam	December 8, 2022 (take home)

Course Policies:

- Learning Cooperatively
  - We encourage you to discuss all of the course activities with your friends and classmates as you are working on them.
  - You will definitely learn more in this class if you work with others than if you do not. Ask questions, answer questions, and share ideas liberally.
- Academic Honesty
  - Cooperation has a limit.
  - You should not share your code or answers directly with other students.
  - Doing so doesn't help them; it just sets them up for trouble on exams.
  - Feel free to discuss the problems with others beforehand, but not the solutions.
  - Please complete your own work and keep it to yourself.
  - The exception to this rule is that you can share everything related to a project with your project partner and turn in one project between you.
  - Penalties for cheating are severe — they range from a zero grade for the assignment up to dismissal from the University, for a second offense.
  - Rather than copying someone else's work, ask for help. You are not alone in this course! We are here to help you succeed. If you invest the time to learn the material and complete the projects, you won't need to copy any answers.
- Copyright of Course Materials
  - Most of the material for this course was prepared by Professor Alex Franks.
  - The lectures and course materials, including PowerPoint presentations, tests, outlines, and similar materials, are protected by U.S. copyright law and by University policy.
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