

# PSTAT 115: INTRODUCTION TO BAYESIAN DATA ANALYSIS

Fall 2022

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<b>Instructor:</b>	Rodrigo Targino	<b>Time:</b>	T/R 8:00-9:15
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## 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](https://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 submitting 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](mailto:rodrigotargino@ucsb.edu): Office Hours, Fridays 3pm

Lauren Hughes [laurenhughes@ucsb.edu](mailto:laurenhughes@ucsb.edu): Office Hours, TBD

Yaqiao (Darcy) Wang [darcywang@ucsb.edu](mailto:darcywang@ucsb.edu): Office Hours, TBD

## 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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  - You may also share those materials with another student who is enrolled in or auditing this course.
  - You may not reproduce, distribute or display (post/upload) lecture notes or recordings or course materials in any other way — whether or not a fee is charged — without my express prior written consent. You also may not allow others to do so.
  - If you do so, you may be subject to student conduct proceedings under the UC Santa Barbara Student Code of Conduct.
  - Similarly, you own the copyright in your original papers and exam essays. If I am interested in posting your answers or papers on the course web site, I will ask for your written permission.