ECON 6100
Introduction to Bayesian Statistics
SPRING 2025 SYLLABUS

CLASS INFORMATION
Time: T 6:00pm–9:15pm
Location: Davis-Shaughnessy Hall 273
Office Hours: TR 3:30pm–4:30pm
Web: github.com/econdojo/bayes-stat

INSTRUCTOR CONTACT
Instructor: Fei Tan
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GENERAL INFORMATION

COURSE DESCRIPTION

This course provides a detailed coverage of Bayesian inferential methods and their applications to a variety of problems drawn from economics and business. Starting with basic concepts of probability and inference, the treatment covers prior and posterior distributions, classical and MCMC simulation methods, regressions for univariate and multivariate outcomes, and computation of the marginal likelihood and model choice. The key learning objective is for students to develop *hands-on* Bayesian and Python skills required to conduct data analysis useful for economic and financial decision making. The course will help prepare students entering doctoral education or starting careers in economics, finance, marketing, operations, accounting, political science, statistics, and biostatistics.

PREREQUISITES

Although the lectures will be self-contained, student are assumed to have completed ECON 4770 (Advanced Econometrics) or an equivalent undergraduate course in statistics and econometrics. Students are also expected to be familiar with basic operations in Python, an interpreted high-level general-purpose programming language.

TEXTBOOKS

- **Required:** *Introduction to Bayesian Econometrics*, 2nd Edition, by Edward Greenberg.
- **Optional:** *An Introduction to Modern Bayesian Econometrics*, by Tony Lancaster.

GRADING POLICY

PROBLEM SETS

There will be three required problem sets. Late submission is not graded and will be nullified. Each problem set is worth 20 points of the course grade; it will be submitted and evaluated on an individual basis. To prepare a submission, please type up your work in LaTeXand upload all source files (including Python programs) onto GitHub Classroom.

- LaTeX typesetting: Overleaf, Texmaker, Vim, Visual Studio Code
- Python programming: Codespaces, Jupyter Notebook, PyCharm, Visual Studio Code

RESEARCH PROJECT

The project consists of a 10–15 pages term paper that makes judicious use of the statistical tools covered in this course to study an empirical topic of your interest. The project accounts for 40 points of the course grade; it will be conducted in teams of 2 to 4 members and evaluated based on collective endeavor. Please follow the same submission requirement as the problem sets.

GRADING SCALE

There is no grading curve used other than the scale below. However, the instructor reserves the right to adjust the grading scale based on overall class performance at the end of the semester.

	Max Points	Grade	Points
Problem Set 1	20	A	92–100
Problem Set 2	20	A-	88–92
Problem Set 3	20	B+	84–88
Research Project	40	B	80–84
Total	100	B-	76–80
		C+	72–76
		C	68–72
		C-	64–68
		D	60–64
		F	0–60

COURSE OUTLINE

Below is a tentative outline; the instructor reserves the right to change it whenever needed. My goal is to proceed at an optimal pace: slow enough that important concepts are thoroughly learned, yet fast enough that the course does not drag. It is a delicate balance.

Part I	**Introduction**
	Lecture 1: Basic Concepts of Probability and Inference
	Lecture 2: Posterior Distributions and Inference
	Lecture 3: Prior Distributions
Part II	**Simulation**
	Lecture 4: Classical Simulation
	Lecture 5: Basics of Markov Chains
	Lecture 6: Simulation by MCMC Methods
Part III	**Applications**
	Lecture 7: Linear Regression and Extensions
	Lecture 8: Multivariate Responses
	Lecture 9: Time Series