

Bayesian Analysis and Decision Theory

STAT 7303

Course Information

- Instructor: Yunzhang Zhu
Office: 425 Cockins Hall
Email: zhu.219@osu.edu
Office Hours: Monday and Wednesday 2:50 pm - 3:50 pm and by appointment (via email).
- Grader: Qiuyu Gu
Email: gu.675@osu.edu
- Lecture Time: 1:50 pm - 2:45 pm, M,W,F, Baker Systems Engineering 128
- Textbook: Berger, J.O., **Statistical Decision Theory and Bayesian Analysis, second edition**. The Ebook is freely available for download at <https://library.ohio-state.edu/record=b8694733>.
- Description: This course covers basic elements of decision theory and Bayes inference. In particular, we will cover the following core topics:
 - Basic elements of Decision Theory
 - Bayesian Expected Loss, Frequentist Risk, Bayes Risk
 - Decision Principles (Bayesian, Frequentist, Likelihood)
 - Foundations (Likelihood Principle, Conditionality Principle)
 - Loss Functions
 - Prior Distributions (Subjective, Noninformative, Improper, Empirical, Hierarchical)
 - Posterior Distributions
 - Bayes Inference (Estimation, Credible Sets, Hypothesis Testing)
 - Bayes Decision Theory
 - Empirical Bayes Analysis

As times permits, we will also cover a selection of the following discretionary topics:

- Bayesian Sequential Analysis
- Sequential Probability Ratio Test
- Hierarchical Bayes Models (Extended coverage)

- Bayesian Calculation
- Predictive Inference
- Bayesian Robustness

Course website

All course materials are kept on Canvas <http://carmen.osu.edu>.

Homework

Roughly 10-12 problem sets will be regularly assigned and graded. Each homework consists of 3-5 problems. You can work together and discuss problems, but please make sure that the write-up is your own. Please also write your homework neatly, so that the TA can easily read it. Turning homework up to one day late will lead to 10% deduction from the assignment points, and no homework will be accepted more than one day late or after the solutions are available.

Exam schedule

There will be three exams for this course. All are closed book and closed notes, and no use of cell phones or other communication devices will be allowed. The exams are **TENTATIVELY** scheduled for:

Exam I	Wednesday, Feb 12 (lecture time)
Exam II	Wednesday, March 25 (lecture time)
Final Exam	Tuesday Apr 28 (4:00 pm - 5:45 pm)

Evaluation

Your final grade for this course will be determined by your performance on homework, the midterms, and final exam. The weights for each are as follows:

Individual Homework	10 %
Exam I	25 %
Exam II	25 %
Final Exam	40 %

You have until one week after receiving your grades on the exams to dispute the grade; the same applies to any homework grade. Note that when asking for a question to be re-graded, the entire assignment/exam may be re-graded, and so you run the risk of losing more points than you gain back.

Academic Integrity

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term

academic misconduct includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Disability Statement

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it and in particular I reserve the right to change due dates or the methods of assessment. Official announcements will ALWAYS be those made in class.