OPTIMAL STATISTICAL DECISIONS

SYLLABUS

Last updated 08/31/2023

Course Information

Table1: Instructor, Classroom and Meeting Time Information

Instructor	Classroom and Meeting Times
David Mwakima	Location: **Sir Thomas Moore Bldg. Ground Floor Room 1**
dmwakima@uci.edu	Lectures: **Wednesday 3pm – 5pm**
	GitHub: https://github.com/davymwax/Optimal-Statistical-Decisions

Seminar Description

Decision theory studies the principles that underlie rational action. Statistical decision theory is a branch of decision theory applied to the traditional problems of statistical inference: estimation (point and interval) and hypothesis testing. For example, choosing to use a given estimator for an unknown parameter can be thought of as an action whose consequences can be evaluated using a suitable loss function. Similarly, Neyman-Pearson hypothesis testing is a special case of a decision procedure for selecting the best critical region subject to some constraints. In this seminar, we shall introduce the main ideas of statistical decision theory and Bayesian statistics. The goal will be to understand the conceptual and philosophical foundations of certain optimality properties of Bayesian methods in statistics.

Tentative Outline of Topics

- **Week 1 & 2 –** Severity and Bayesian Inference; Elements of Classical and Bayesian Decision Theory
- **Week 3 –** Robust Bayesian Analysis; Bayes Factors with Bayes Risk

Learning Outcomes

By the end of this seminar, participants should be familiar with the main topics currently being debated in the foundations of Bayesian statistics within the philosophy of science.

Prerequisites

At least one-year graduate level course in probability theory and statistics OR mathematics at the undergraduate or graduate level including familiarity with some ideas from Real Analysis (sup, inf) and multivariable calculus.

Required Texts and Recommended Reading

There is no required text for the seminar. Any the readings you will be expected to do will be provided as excerpts from various sources. The following texts are recommended:

- James O. Berger *Statistical Decision Theory and Bayesian Analysis*
- Morris G. DeGroot *Optimal Statistical Decisions*
- Deborah Mayo *Statistical Inference as Severe Testing: How to Get Beyond the Statistics Wars*
- Christian P. Robert *The Bayesian Choice*
- Mark J. Schervish *Theory of Statistics*

Tentative Course Requirements/Grades

TBA

Disability Accommodations

N/A

Academic Integrity

N/A

Diversity

N/A

Inclusion

N/A