UCI Statistics Graduate Student Bootcamp

Fall 2019

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Dates: 9/9 - 9/13; 9/16 - 9/18
Time: 9 am - 4 pm
Class Room: CS 432

Course Description

This short course is designed to prepare incoming Statistics graduate students for the required first year PhD courses. The topics and level of difficulty are intended for students with a background in mathematics and some experience with statistics. The primary aims of this course are to provide you with a review of important background topics that will be needed in your first year courses, and to help you identify any areas you may need to focus on in your own studies. Be aware that we may not cover all the important background topics in sufficient depth, and all students are expected to study and prepare on their own to ensure they are adequately prepared. This course is mandatory for all Statistics PhD students, and open to all Statistics Masters students.

The course will be held on 9/9 - 9/13 and 9/16 - 9/18 from 9 am - 4 pm each day. The morning will consist of lecture on a particular topic, followed by a discussion session in the afternoon for applications and problem-solving practice.

Required Materials

- Laptop with R and RStudio installed, and a wi-fi connection.
- Notebook and pens.

Prerequisites/Corequisites

1. Combinatorics and basic probability.
2. Introductory statistics: estimators, sampling distributions, confidence intervals, hypothesis testing.
3. Multivariate calculus: derivatives, integrals, optimization, sequences and series.
4. Linear algebra: vector spaces, matrix operations, matrix decompositions, projections.
5. Some programming experience.

Assessments

Assessments are conducted purely for department reference and in no way affect your standing or academic record.

An initial assessment exam will be given to help you gauge your level familiarity with the topics we will be covering. At the conclusion of the bootcamp, there will a final assessment exam on similar topics to determine if there are any topics you should continue to review.

Schedule

Date	Topic	Notes
9/9	Probability	Basic Probability Theory Sample Spaces and Events Axioms of Probability Conditional Probability Bayes Rule
9/10	Calculus Review	Derivatives and Integrals Limits and convergence of series Optimization Methods
9/11	`R` Programming I	Programming Basics Calculations in `R` Working with functions Intro to plotting
9/12	Prob & Stats	Distributions Properties of Random Variables Moment Generating Functions Some common distributions Likelihood function Estimators
9/13	Linear Algebra	Vector spaces Matrix operations Eigenvalues, eigenvectors, decompositions Quadratic forms Calculus with vectors and matrices
9/16	Statistics	Sampling distributions Confidence intervals Hypothesis testing Two-sample t-test ANOVA
9/17	Statistics	Models Linear Regression Fitting, interpretation, diagnostics
9/18	`R` Programming II	Distribution functions Working with data Vector operations Simulations Models

Selected Texts

1. *Statistical Inference*, Casella & Berger
2. *Introduction to Linear Algebra*, Strang
3. *A First Course in Probability*, Ross
4. *Calculus: Early Transcendentals*, Stewart