Disclaimer: These notes have not been subjected to the usual scrutiny reserved for formal publications. They may be distributed outside this class only with the permission of the Lecturer.

What will the course be about?

This is a 10-week lecture-based course focused on introducing the very foundation of probability, the celebrated measure theory, which ends a hundreds-of-years debate of Bayesian v.s. Frequentist. We start from the set theory, the measures on sets, the measurable functions, then introduce the Lebesgue integral and modes of convergence established on it, and end the course with an introduction to probability distributions and quantile functions established on this solid foundation.

Course plan

C1. Sets and measures
   C1.1. Class organization, logic, and paradoxes (1-2nd week)
   C1.2. Basic properties of measures (2-3rd weeks)
   C1.3. Construction and extension of measures (3rd week)

C2. Measurable functions and convergence
   C2.1. Mapping and measurable functions (3-4th weeks)
   C2.2. Convergence (5th week)
   C2.3. Probability, RVs, and convergence in law (5-6th weeks)

C3. Integration
   C3.1. The Lebesgue integral and its properties (6-7th weeks)
   C3.2. Inequalities (7th weeks)
   C3.3. Modes of convergence (8th week)

C4. Derivatives (8-9th weeks)

C5. Measures and processes on products (9th week)

C6. Distribution and quantile functions (10th week)
References

The course is built on the following book:


The following four books are also referenced:


Prerequisites

This course requires either MATH 424 and MATH 425, or MATH 574 and MATH 575, and is appropriate for an undergraduate student of a mathematics/probability/statistics background, and requires a certain level of mathematical maturity. Please do not hesitate to approach the instructor if you have any concern.

Evaluation

There will be six homeworks (40%), one midterm (30%), and one final exam (30%). The final grade will be curved.

Miscellanea

Instructor: Fang Han (fanghan@uw.edu)
Office hour: Wednesday 1:00-2:00PM at PDL B-308
Location: PCAR 492
Time: WF 11:30-12:50