Math/Stat 733

Theory of Probability I

Notebook

Zijie Zhang

September 8, 2020

Contents

1 Overview

1.1 Basic Information

Meetings: TR 1pm-2:15pm (online)
Instructor: Benedek Valkó
Email: valko@math.wisc.edu
Office hours: Tu 4-5pm, F 3-4pm, or by appointment (online)

1.2 Textbook

Richard Durrett: Probability: Theory and Examples, 5th edition, 2019

Extra Reading

- Olav Kallenberg: Foundations of Modern Probability. 2nd edition, Springer, 2002

- William Feller. An introduction to probability theory and its applications. Vol. I. Third edition. John Wiley and Sons Inc., New York, 1968.

- David Williams. Probability with martingales. Cambridge Mathematical Textbooks. Cambridge University Press, Cambridge, 1991.

- Patrick Billingsley. Probability and measure. Wiley Series in Probability and Mathematical Statistics. John Wiley & Sons Inc., New York, 1995.

1.3 Course content

We cover selected portions of Chapters 1-4 of Durrett. This is a rough course outline:

- Weeks 1-2: Foundations, properties of probability spaces

- Weeks 3-5: Independence, 0-1 laws, strong law of large numbers

- Weeks 6-10: Characteristic functions, weak convergence and the central limit theorem

- Weeks 11-15: Conditional expectation, Martingales

The course continues in the spring semester as Math 734 covering topics such as Markov chains, stationary processes, ergodic theory, and Brownian motion.

1.4 Evaluation

Course grades will be based on *biweekly*
   home work assignments (25%),
   class participation (15%),
   a midterm exam (30%)
   and the **final exam (30%)**.
(See the Canvas page for more information.)

End of Update on 2020/08/29

2   Sep 3, Thursday

2.1   Intro

Upload Homework 1 on Canvas before Sep 13.

- Mid exam and final exam, open book.

- Midterm is evening midterm.

- Textbook is *Richard Durrett: Probability: Theory and Examples, 5th edition, 2019.*

- Notes will be uploaded.

2.1.1   What is probability theory?

Goal: model uncertain events, quantify ...
Simple examples with built in symmetry.

- Filp a fair coin.
  What's the probability of

2.2   Kolmogorov axioms, examples

End of Update on 2020/09/03