

DoSS Summer Prep Bootcamp 2022

Probability

1 Time & Place

TBD

2 Instructor

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3 Course Outline

Basics of probability theory, distribution theory of random variables, moments and inequalities, limit theorems, and stochastic processes.

4 Textbooks

Primary textbooks:

1. *A First Course in Probability* by Sheldon Ross
2. *Probability: Theory and Examples* by Rick Durrett
3. *A First Look at Stochastic Processes* by Jeffery S. Rosenthal

Optional texts:

- All of Statistics* by L. Wasserman
- Statistical Inference* by George Casella and Robert L. Berger
- Probability and Measure* by Patrick Billingsley
- A First Look at Rigorous Probability Theory* by Jeffery S. Rosenthal

5 Tentative Lecture Schedule

The lecture topics and corresponding chapters in the texts (if applicable) are outlined below. This schedule is tentative and will inevitably be augmented during the course.

Lecture	Topics	References
1	Course introduction Basics of probability	1 (Chp 2)
2	Random Variables	1 (Chp 3)
3	Common random variables Exponential family	1 (Chp 4, Chp 5)
4	Joint and marginal distributions Functions of random variables	1 (Chp 6)
5	Change of variables Expectation and moments	1 (Chp 7)
6	Covariance Concentration inequalities	1 (Chp 8)
7	Stochastic convergence	2 (Chp 2, Chp 3)
8	Slutsky's theorem, Law of Large Numbers Central Limit Theorem	2 (Chp 2) 2 (Chp 3)
9	Markov Chain	3 (Chp 1)
10	Poisson Process Brownian Motion	1 (Chp 9) 3 (Chp 4)