STAT 212 Schedule

- 01/28 — Review of random variables; convergence notions and applications.
- 01/30 — Martingales, Uniform Integrability and $L^1$ convergence. (Durrett Section 4.6)
- 02/04 — $L^p$ convergence of martingales; Doob’s maximal inequality. (Durrett Section 4.4)
- 02/06 — Reverse martingales; Hewitt-Savage 0/1 law; Exchangeability. (Durrett Section 4.7)
- 02/11 — Exchangeability (cont’d). (Durrett Section 4.7). Reading: Doob decomposition (Durrett Theorem 4.3.2) and applications to $L^2$ bounded martingales (Durrett Theorem 4.5.1, 4.5.2).
- 02/13 — Brownian Motion — introduction, existence and uniqueness. (Mörters-Peres Section 1.1.1-1.1.2).
- 02/18 — Brownian Motion on $[0,\infty)$; Brownian Scaling; Path Properties. (Mörters-Peres Section 1.1.3)
- 02/20 — Non-differentiability of Brownian Motion; Markov Property. (Mörters-Peres Section 1.3, 2.1)
- 02/25 — Markov Property; Blumenthal’s 0/1 law; Stopping Times. (Mörters-Peres Section 2.1)
- 02/27 — Strong Markov Property; Reflection Principle. (Mörters-Peres Section 2.2.1)
- 03/03 — Continuous time martingales; Wald’s equation (Mörters-Peres Section 2.4)
- 03/05 — Weak convergence of probability measures, Portmanteau Theorem.
- 03/12 — Donsker Invariance Principle, Skorohod Embedding. (Durrett Section 8.1)
- 03/24 — Donsker Invariance Principle (cont’d).
- 03/26 — Weak convergence on Polish spaces, Prokhorov’s theorem, tightness.
- 03/31 — Stochastic processes, Kolmogorov existence theorem, Kolmogorov-Centsov criterion.
• 04/02 — Introduction to stochastic integrals, progressively measurable processes. (Mörters-Peres Section 7.1.1)

• 04/07 — Construction of the stochastic integral, Itô isometry.

• 04/09 — Itô integral as a stochastic process, martingale property of stochastic integrals, Itô formula. (Mörters-Peres Section 7.1.1-7.1.2)

• 04/14 — Itô formula (cont’d), solving SDEs using Itô formula.

• 04/16 — Existence and uniqueness of strong solutions of SDEs.

• 04/21 — Concentration inequalities—bounded differences inequality.

• 04/23 — Bounding the variance—Efron-Stein inequality.

• 04/28 — Review and look-ahead.