MA 501: Introductory Measure Theory (3-1-0:4)

Measure space and probability space: σ-algebra, events, measures, probability measures, examples, Borel σ-algebras, outer measure, Lebesgue measure, limit inferior and limit superior of a sequence of events, measurability and measurable functions.

Lebesgue integral: inductive definition via simple functions, existence of the integral, properties of the integral, expectation as Lebesgue integral, dominated convergence theorem, monotone convergence, Fatou's lemma, $L_p$spaces, integrable real valued random variables, moments, absolute moments, variance. densities: dominated measures, Radon-Nikodym theorem, uniqueness of densities, Lebesgue densities, examples.

Products of measurable spaces: Fubini's theorem, Product of a finite family of σ-algebras.

Text Books and References:

1. H. L. Royden and P. M. Fitzpatrick, "Real Analysis", PHI
2. I. K. Rana, "An Introduction to Measure and Integration", Narosa Book Distributors
3. E. M. Stein and R. Shakarchi, "Real analysis: Measure Theory, Integration, and Hilbert Spaces", Princeton University Press
4. G. B. Folland, "Real analysis: Modern Techniques and their Applications", Wiley
5. S. Athreya and V. S. Sunder, "Measure and Probability", Universities Press