Advanced Probability

Three professors from Paris, names to be announced

Chapter I. Martingales
- Conditional expectation
- Martingales
- Discrete stochastic integration
- Convergences
- Applications to branching processes
- Uniform integrability

Chapter II*. Content to be announced.

Chapter III. Markov Chains
- Definitions and Markov property
- Recurrence, transience
- Stationary measures and ergodic theorems
- Applications

Chapter IV*. Content to be announced.

Chapter V. Brownian motion
- Construction
- Markov property
- Sample paths
- Donsker's theorem

Chapter VI*. Content to be announced.

Chapters II, IV and VI are not part of the program in the examinations. Each of these chapters gives a quick glance at a research topic.

References

[1] BRÉMAUD, P. *Markov chains*, vol. 31 of *Texts in Applied Mathematics*. Springer-Verlag, New York, 1999. Gibbs fields, Monte Carlo simulation, and queues.

[2] DURRETT, R. *Probability: theory and examples*, fourth ed. Cambridge Series in Statistical and Probabilistic Mathematics. Cambridge University Press, Cambridge, 2010.

[3] HÄGGSTRÖM, O. *Finite Markov chains and algorithmic applications*, vol. 52 of *London Mathematical Society Student Texts*. Cambridge University Press, Cambridge, 2002.

[4] LE GALL, J.-F. *Intégration, Probabilités et Processus Aléatoires*, Lectures delivered at the École Normale Supérieure, http://www.math.u-psud.fr/˜jflegall/IPPA2.pdf, 2006.

[5] WILLIAMS, D. *Probability with martingales*, Cambridge University Press. xv, 251 p., 1991.