

Oral Exam Syllabus

Shanshan Ding, April 15th 2010

Major: Probability

Primary text: Durrett, *Probability: Theory and Examples*

- **Chapter 1:** preliminary definitions, Borel-Cantelli lemmas, laws of large numbers, large deviations
- **Chapter 2:** convergence in distribution, characteristic functions, central limit theorems (including Erdős-Kac theorem), Poisson limits and Poisson processes, stable laws
- **Chapter 3:** random walks and stopping times
- **Chapter 4:** conditional expectation, martingales
- **Chapter 5:** Markov chains (finite, countable)

Minor: Algebraic Number Theory

Primary text: Marcus, *Number Fields*

- **Chapter 2:** quadratic and cyclotomic fields, rings of integers, embeddings, trace, norm and discriminant
- **Chapter 3:** Dedekind domains, behavior of primes in extensions of \mathbb{Q}
- **Chapter 4:** decomposition and inertia groups, quadratic reciprocity
- **Chapter 5:** class number, Minkowski's bound, structure of unit groups
- Prime number theorem, density theorems of Dirichlet and Chebotarev (statements)