

Requirements

Final mark is based on homework assignments (10 points) and two midterm tests (45 points each). From each midterm test, reaching 20 points is required to pass. Either or both midterm tests can be retaken at the end of the semester. Homeworks and midterm tests consist of problem solving.

Homework: publication times and deadlines will be available in time.

Maximal total score is $10+45+45=100$. Marks based on the total score are as follows:

- 0–39: 1 (fail)
- 40–54: 2
- 55–69: 3
- 70–84: 4
- 85–100: 5

Topics throughout the semester:

- ① Basic probability
- ② Generating functions, branching processes
- ③ Poisson processes
- ④ Probability concentration
- ⑤ Discrete time Markov chains
- ⑥ Continuous time Markov chains
- ⑦ Statistics: parameter estimation, hypothesis testing

Recommended reading (Illés Horváth's suggestions)

Recommended reading:

- V. G. Kulkarni: Introduction to Modeling and Analysis of Stochastic Systems, 2nd edition (Springer, 2011)
- Sheldon Ross: Introduction to Probability Models (Academic Press, Elsevier 2006)
- Bhattacharyya, Johnson: Statistical principles and Methods (Wiley, 1987)
- A. W. van der Vaart: Asymptotic Statistics (Cambridge University Press, 1998)

Recommended reading (Illés Horváth's suggestions)

Relevant book chapters per topic. I recommend Kulkarni wherever applicable. In general, the other books are more detailed than expected; focus on definitions, main theorems and examples rather than proofs and lemmas.

- Basic probability: Durrett (Probability) chapters 1.1, 1.2, 1.3, 1.6, 2.1 (pages 37-38)
- Probability generating function: Grinstead-Snell 10.1 (from subsection Ordinary Generating Function)
- Branching processes: Grinstead-Snell 10.1
- Poisson processes: Durrett (Stochastic Processes) 2.2, Kulkarni 3
- Concentration theorems: Durrett (Probability) 2.4, 3.4.1, 3.4.4, 2.6
- Discrete time Markov chains: Durrett (Probability) 6.1-6.7, Ross 4.1-4.6, Kulkarni 2.1-2.6
- Continuous time Markov chains: Ross 6.1-6.5, Kulkarni 4.1-4.7, 6.3