Markov Processess

Examination: about 30 minutes; Randomly gets two of the subjects below. During the preparation time, the student chooses one of the two subject and prepare it (she/he can take what she/he prepared in that time in the exam). The exam will start by discussing one of the subject. Questions beyond the basic subject are of course not excluded.

Subjects

- Markov Chains: Transition functions, backwards equation and minimal solutions (defs, main thms: 1.6, 1.8, uniqueness and substochasticity)
- Markov Chains: The probabilistic construction and consequences (e.g. prop 1.16, probabilistic meaning of the question of uniqueness)
- Feller Processes: Semigroup and its relation with the generator (Def, properties and examples, thms 2.9 and 2.10)
- Feller Processes: Generator, domains and relation with the semigroup (Def, examples, thm 2.10; How to recover T(t) via thm 2.14 or how to get generators from operators via prop 2.24)
- Feller Processes: Generator and diffusion processes (defs, continuity via thm 2.22, examples: e.g., BM with change of speed or relected / absorbed BM)
- Feller Processes: Stationary distributions (def, core of a generator, thm 2.31, case of compact S, Lem 2.33 or Lem 2.34)
- Feller Processes: Duality (def, examples, thm 2.36, applications e.g. ex3b, sheet 7)
- Feller Processes: Martingal problem and applications (def, thm 2.27, 2.28; applications e.g. thm 2.40 (b))
- Interacting particle systems: Existence and ergodicity (setting, existence and ergodicity thm 3.3, 3.5, examples)
- Interacting particle systems: Coupling and attractiveness (def, thm 3.7, 3.11, examples)
- Interacting particle systems: Correlation inequalities (def, thm 3.19, cor 3.20-3.22, examples)
- Interacting particle systems: The linear voter model (def, duality thm 3.25, stationary distributions)