

Hauptseminar “Advanced Monte Carlo Methods”

Monte Carlo methods use random numbers for the numerical solution of complex stochastic problems and approximate integration or data analysis in high-dimensional domains. While elementary methods may directly identify measures appearing in problem and algorithm, more complex methods construct Markov chains with a stationary distribution identical to a target distribution. A given target distribution leaves great freedom in the construction of the chain, resulting in a rich variety of algorithms.

Recommended prerequisite: Any course including elementary probability theory.

Available topics:

1. Elementary Monte Carlo Methods
2. Metropolis-Hastings Algorithm
3. Random Number Generators
4. Bayesian Inference with Monte Carlo Methods
5. Hamiltonian Monte Carlo Method
6. Auxiliary-Variable Monte Carlo Method (Master program)
7. Quantum Monte Carlo Method (Master program)
8. Monte Carlo Methods in Finance