STAT 721 Spring 2024 Class Schedule

Ray Bai

Point Processes

- **1/8/24**: class overview, preliminaries for stochastic processes
- **1/10/24**: homogeneous Poisson processes
- **1/12/24**: homogeneous Poisson processes, spatial point processes
- **1/15/24**: **Martin Luther King Jr. Day (no class)**
- **1/17/24**: spatial point processes, nonhomogeneous Poisson processes
- **1/19/24**: nonhomogeneous Poisson processes
- **1/22/24**: estimation and prediction with Poisson processes

Mathematical Finance

- **1/24/24**: random walks
- **1/26/24**: Brownian motion, financial derivatives, options
- **1/29/24**: no-arbitrage principle
- **1/31/24**: binomial options pricing model
- **2/2/24**: Itô integral
- **2/5/24**: stochastic differential equations
- **2/7/24**: Black-Scholes model for European options
- **2/9/24**: Black-Scholes model, Greeks, and volatility

Gaussian Processes

- **2/12/24**: Bayesian inference
- **2/14/24**: multivariate Gaussian distribution
- **2/16/24**: covariance functions and notions of stationarity
- **2/19/24**: Gaussian processes (GPs)
- **2/21/24**: GP regression
- **2/23/24**: empirical Bayes for hyperparameter selection
- **2/26/24**: scalable GPs for big data
- **2/28/24**: scalable GPs for big data

Markov Chain Monte Carlo (MCMC)

- **3/1/24**: Monte Carlo methods, introduction to MCMC

Spring break 3/4/24-3/8/24 (no class)

- **3/11/24**: Metropolis-Hastings algorithm
- **3/13/24**: Metropolis-Hastings algorithm, Gibbs sampling
- **3/15/24**: Metropolis-within-Gibbs, MCMC diagnostics
- **3/18/24**: Hamiltonian Monte Carlo

Dirichlet Processes

- **3/20/24**: Dirichlet distribution, Dirichlet process
- **3/22/24**: constructive definitions of Dirichlet process (stick-breaking, Chinese restaurant process)
- **3/25/24**: Bayesian Gaussian mixture models
- **3/27/24**: Dirichlet process mixture models (DPMMs)
- **3/29/24**: clustering and density estimation with DPMMs

Reinforcement Learning

- **4/1/24**: Markov decision processes, reinforcement learning
- **4/3/24**: Bellman equation, optimal policy, dynamic programming
- **4/5/24**: policy evaluation and policy iteration
- **4/8/24**: value iteration, tabular Q-learning
- **4/10/24**: Q-learning with linear function approximation, policy gradient methods
- **4/11/24**: **(asynchronous lecture)** deep reinforcement learning, deep Q-networks (DQNs)
- **4/12/24**: policy gradient methods
- **4/15/24**: actor-critic methods **(first half of 4/15 class)**

Student Project Presentations

- **4/15/24**: student project presentations **(second half of 4/15 class)**
- **4/17/24**: student project presentations
- **4/19/24**: **class canceled (Palmetto Symposium)**
- **4/22/24**: student project presentations