Objective

The end of the course goal is to allow the student to critically decide between a Bayesian, a frequentist or Bayesian-frequentist compromise when facing real world problems in the fields of micro-econometrics, macro-econometrics, marketing and finance. With this end in mind, we will visit well known Bayesian issues, such as prior specification and model comparison and model averaging, but also study regularization, “small $n$, large $p$” issues, Bayesian statistical learning (additive regression trees) and large-scale factor models.

Course description

- Basic ingredients: prior, posterior, and predictive distributions, sequential Bayes, conjugate analysis, exchangeability, principles of data reduction and decision theory.
- Model criticism: Bayes factor, computing marginal likelihoods, Savage-Dickey ratio, reversible jump MCMC, Bayesian model averaging and deviance information criterion.
- Modern computation via (Markov chain) Monte Carlo methods: Monte Carlo integration, sampling-importance resampling, Gibbs sampler, Metropolis-Hastings algorithms.
- Mixture models
- Hierarchical models
- Bayesian regularization
- Instrumental variables modeling
- Large-scale (sparse) factor modeling
- Bayesian additive regression trees (BART) and related topics
- Dynamic models
- Sequential Monte Carlo algorithms
- Bayesian methods in microeconometrics, macroeconometrics, marketing and finance