

STAT 638 Course Description and Outline

This course is concerned with Bayesian statistics, which is a particular approach to statistical inference that differs philosophically and operationally from the classic frequentist approach. After defining Bayesian inference, its advantages will be discussed, and its application illustrated using some classical models, including binomial, Poisson and normal data, the multivariate normal model and linear regression. Hierarchical models are also defined and discussed. Bayesian inference is based on a so-called posterior distribution, which can only be computed exactly in relatively simple cases. Therefore, a modern method of approximating posteriors, known as Markov Chain Monte Carlo, is treated.

1. Introduction
2. Conditional distributions and Bayes rule
3. One-parameter models
4. Monte Carlo approximation
5. The normal model
6. Gibbs sampling
7. The multivariate normal model
8. Group comparisons and hierarchical modeling
9. Linear regression
10. Markov chain Monte Carlo
11. Mixed effects models