

SYLLABUS

STA 7348

Bayesian Theory

Fall, 2025

Instructor: Malay Ghosh
Office: 223 Griffin-Floyd Hall
Phone: 273-2992

Objective:

The objective of the Bayesian Theory course is to provide students with a solid foundation of the theory underlying the Bayesian paradigm. In particular, we will discuss issues related to selection of priors, Bayesian inference both exact and asymptotic, Bayesian model selection and Bayesian nonparametrics. We will also discuss briefly theoretical background for MCMC and Variational Bayes Methods.

Policy:

A student's grade for the spring semester is determined from homework (70%), and a comprehensive open notes final (30%).

Course Outline:

1. Bayesian Inference
2. Large Sample Methods
3. Selection of Priors
4. Hierarchical versus Empirical Bayes
5. MCMC and Variational Bayes
6. Hypothesis Testing and Model Selection
7. Bayesian Nonparametrics

References:

1. An Introduction to Bayesian Analysis: Theory and Methods. J.K. Ghosh. M. Delampady and T. Samanta. Springer, New York.
2. J.O. Berger: Statistical Decision Theory and Bayesian Analysis, 2nd Edition.
3. J.M. Bernardo and A.F.M. Smith: Bayesian Theory.
4. B.P. Carlin and T.A. Louis: Bayes and Empirical Bayes Methods for Data Analysis, 3rd Edition.
5. A. Gelman, J.B. Carlin, H.S. Stern and D.B. Rubin: Bayesian Data Analysis, 3rd Edition.
6. J.A. Hartigan: Bayes Theory.
7. P.D. Hoff: A First Course in Bayesian Statistical Methods.
8. S.J. Press: Bayesian Statistics: Principles, Models and Applications
9. C.P. Robert: The Bayesian Choice, 2nd Edition.
10. M. Schervish: Theory of Statistics.