Introduction to Bayesian Statistics - STAT 4XX/6XX

Spring 2019—AB 635—Mon,Wed 1:00pm - 2:15pm

Instructor:	A. Grant Schissler	**Contact**:	aschissler@unr.edu, 775-784-4661 (office)
Office:	DMSC 224	**Hours**:	Tue 2:30pm-3:30pm, Wed 1:30pm-2:30pm, or by appointment

Catalog Description

Statistical inference using Bayes Theorem. Topics include Bayesian/frequentist comparison, posterior analysis for continuous and discrete random variables, prior specification, Bayesian regression, multivariate inference, and posterior sampling through Markov Chain Monte Carlo.

Broad student learning outcomes

UG1 Students will be able to demonstrate understanding of the concepts that underlie Bayesian inference and compare the results to frequentist alternatives.

UG2 Students will be able to conduct Bayesian inference analytically and interpret the results.

UG3 Students will be able to perform a Bayesian analysis using professional statistical packages (e.g., Minitab, R, and Stan).

GRAD1 Students will be able to synthesize course concepts to apply Bayesian modeling techniques to real-world data in the pursuit of scientific inquiry.

Course outcomes

Students will be able to . . .

1. explain the role of statistics in science using sampling theory.
2. describe and summarize data numerically and visually.
3. apply probability theory to analyze uncertainty in real world problems.
4. model parameters and data using discrete random variables.
5. conduct Bayesian inference for parameters of discrete random variables.
6. model parameters and data using continuous random variables.
7. conduct Bayesian inference for a binomial proportion.
8. compare Frequentist/Bayes approaches for inferring a binomial proportion.
9. conduct Bayesian inference for a Normal mean parameter.
10. compare Frequentist/Bayes approaches for inferring a Normal mean parameter.
11. estimate parameters in a Bayesian linear regression.
12. conduct Bayesian inference for a Normal variance parameter.

13. will apply robust Bayes methods for prior misspecification.
14. conduct Bayesian inference for parameters in a multivariate Normal.
15. use Markov Chain Monte Carlo (MCMC) to sample from posterior distributions.