

CONTENTS

List of Tables	xi
List of Figures	xiii
About the Author	xvii
Series Editor's Introduction	xix
Acknowledgments	xxi
1. Introduction	1
Data and Topics Explored in Examples	4
Mathematical Knowledge Required for this Volume	9
Layout of the Book	11
2. Probability Distributions and Review of Classical Analysis	13
Probability Distributions	15
Important Distributions in Bayesian Statistics	17
Marginal and Conditional Distributions	25
Review of Maximum Likelihood Analysis	28
3. The Bayesian Approach to Probability and Statistics	34
Including a Prior Distribution and Summarizing the Posterior	37
More on Priors	43
Extending the Beta/Binomial Model to the Dirichlet/Multinomial	48
Normal Distribution Examples	51
4. Markov Chain Monte Carlo (MCMC) Sampling Methods	62
Logic of Sampling to Summarize Distributions	63
A Simple Method for When Direct Simulation Is Impossible	66
Markov Processes and Chains	68
Basic Markov Chain Monte Carlo Methods	71
Slice Sampling	91
Evaluating MCMC Algorithm Performance	96
5. Implementing the Bayesian Approach in Realistic Applications	111
The Linear Model	111
The Dichotomous Probit Model	123
A Latent Class (Finite Mixture) Model	133
Comparing Models and Evaluating Model Fit	150

6. Conclusion	160
Why Take a Bayesian Perspective?	161
Some Additional Suggested Readings	166
Appendix	169
1. R Program for Simple Three-State Model With Uniform Proposal in Chapter 4	169
2. R Program for Simple Three-State Model With Nonuniform Proposal in Chapter 4	170
3. Random Walk Metropolis–Hastings Algorithm	171
4. Function for Computing Original Gelman–Rubin Diagnostic	172
5. Gibbs Sampler for the Linear Regression Model With Reference Prior	173
6. Gibbs Sampler for the Probit Regression Model With Uniform Priors	174
7. Gibbs Sampler for Two-Class Latent Class Model With Priors	175
8. Posterior Predictive Distribution Simulation (for Linear Model)	177
References	178
Index	181