Syllabus

Dr. Daniel B. Rowe
Professor of Computational Statistics
Department of Mathematical and Statistical Sciences
Marquette University

Department of Mathematical and Statistical Sciences
Marquette University

Introductions

Department of Mathematical and Statistical Sciences
Marquette University

Syllabus
Fall 2025

Course: MATH 4790/MSSC 5790 Bayesian Statistics

Time: TuTh 3:30 pm - 4:45 pm

Location: Cudahy 126 (in-person)

Office Hours: Tu 2:30 pm – 3:30 Help Desk
Th 2:30 pm – 3:30 Office
TuTh 6:15 pm – 6:45 Office

Instructor: Daniel B. Rowe, Ph.D. daniel.rowe@marquette.edu

Office: Cudahy 313

Syllabus

Course Description From The University Bulletin

MATH 4790/MSSC 5790. Bayesian Statistics 3 cr. hrs.

Bivariate, conditional and marginal distributions. The Bayesian philosophy, quantification of *a priori* information, prior, likelihood and posterior distributions. Bayesian linear models, posterior parameter estimation including maximum *a posteriori* and marginal expectations. Topics may include numerical integration and Markov chain Monte Carlo techniques. Use of a high-level software package

Prereq: COSC 1010, MATH 1451, and MATH 4720 or the equivalents.

Syllabus

MATH 4790/MSSC 5790. Bayesian Statistics. 3 cr. hrs.

Course Grading

Homework:	30%
Midterm:	30%
Final:	40%

Syllabus

Topics:

- Events and probabilities of events.
- Conditional probability and Bayes' rule.
- Common discrete and continuous likelihood and prior distributions.
- Maximum likelihood parameter estimation.
- The bivariate normal, bivariate Student-t, and normal-inverse gamma distributions. Conditional and marginal distributions.
- Subjective assessment of prior information.
- Conjugate and non-conjugate prior distributions.

Syllabus

Topics:

- Maximum *a posteriori* and marginal mean estimation.
- Bayesian estimation of the binomial probability of success.
- Bayesian estimation of the mean of a normal distribution.
- Bayesian estimation of the least squares regression coefficients.
- Bayesian LASSO regression
- Bayesian classification.
- Markov chain Monte Carlo numerical integration.
- Additional topics if time permitting.

- All topics and assignments will have a computational aspect.
  Throughout the course you will implement techniques in Matlab.
  I will provide a lot of sample code for you to mimic and draw from.

Syllabus

Questions?