

Department of Mathematical and Statistical Sciences

Marquette University

Fall 2023

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

Time: TuTh 3:30 pm – 4:45 pm

Place: Cudahy Hall 126

Instructor: Daniel B. Rowe, Ph.D.

Office Hours: Tu 1:00 pm–2:00 pm (office), Th 1:00 pm–2:00 pm (help desk),
TuTh 4:45 pm – 5:15 pm (office)

Office: CU 313

E-mail: daniel.rowe@marquette.edu

Required text: None. Course material will be presented via lecture slides or handouts.

Grading: Grades will be based upon homework that you present in class (30%) when called upon, a midterm (30%) and a final (40%). The midterm may include both in-class and take home portions. The final may be take-home or a final term project.

MATH 4790/MSSC 5790: Students in MSSC 5790 will have additional assignments.

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.
- 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.
- All topics and assignments will have a computational aspect.
- Additional topics if time permitting.