

# MATH-640: Bayesian Statistics

## Spring 2016 – Course Syllabus

**Instructor:** Mahlet Tadesse  
**Office:** 308 St. Mary's Hall  
**e-mail:** mgt26@georgetown.edu  
**Office hours:** Wed. 5:00-6:00 PM

**Class schedule:** Wed. 6:30 – 9:00 PM

**Location:** ICC 119

### Required Textbook:

Gelman A, Carlin JB, Stern HS, Dunson DB, Vehtari A and Rubin DB (2014) *Bayesian Data Analysis*, 3<sup>rd</sup> Ed., CRC Press.

### Reference Textbooks (on reserve at Blommer Science Library):

Hoff, P.D. (2009) *A First Course in Bayesian Statistical Methods*, Springer.

Carlin, B.P. and Louis, T.A. (2009) *Bayesian Methods for Data Analysis*, 3<sup>rd</sup> Ed. CRC Press.

### Course Description:

This course provides a practical introduction to Bayesian statistical methods. Students will learn the fundamentals of Bayesian inference and will be exposed to Monte Carlo simulation methods. The first part of the course will focus on the specification of prior distributions, the evaluation of posterior and predictive distributions, and the theory of Bayesian estimation and hypothesis testing. The second part of the course will focus on Markov chain Monte Carlo methods, including the Gibbs sampler and the Metropolis-Hastings algorithm. A variety of statistical models will be considered and illustrated with examples from a wide range of applications. The open source software R will be used to carry out Bayesian analysis.

### Prerequisites:

Background in probability at the level of MATH-501 and familiarity with statistical inference are required. Students also need to have some computing skills (familiarity with R or knowledge of a programming language).

### Course Website:

Course information and material, including lecture notes, homework assignments, announcements, etc. will be posted on Blackboard. You will need your University NetID and password to log in ([campus.georgetown.edu](http://campus.georgetown.edu)). Please bring a printout of the relevant lecture notes to each class.

### Assessment:

Your grade will be based on homework assignments (40%) and two exams (30% each). All assignments will be posted on Blackboard and must be turned in at the beginning of class on the due date. Late assignments will not be accepted.

Homework	40%
Midterm exam	30% – March 23
Final exam	30% – due May 11

### **Important Dates:**

Jan. 13	First day of class
Jan. 18	Martin Luther King Day
Jan. 22	Last day for registration changes
Feb. 15	President's Day
Mar. 7 – 11	Spring break
Mar. 23	Mid-term exam
Mar. 24 – 28	Easter break
Apr. 27	Last day to withdraw for graduate students
May 2	Last day of classes
May 11	Final exam

### **Standards of Conduct:**

*As signatories to the Georgetown University Honor Pledge, and simply as good scholars and citizens, you are required to uphold academic honesty in all aspects of this course. You are expected to be familiar with the letter and spirit of the Standards of Conduct outlined in the Georgetown Honor System and on the Honor Council website ([gervaseprograms.georgetown.edu/honor/system/](http://gervaseprograms.georgetown.edu/honor/system/)). As a faculty member, I too am obligated to uphold the Honor System, and will report all suspected cases of academic dishonesty.*