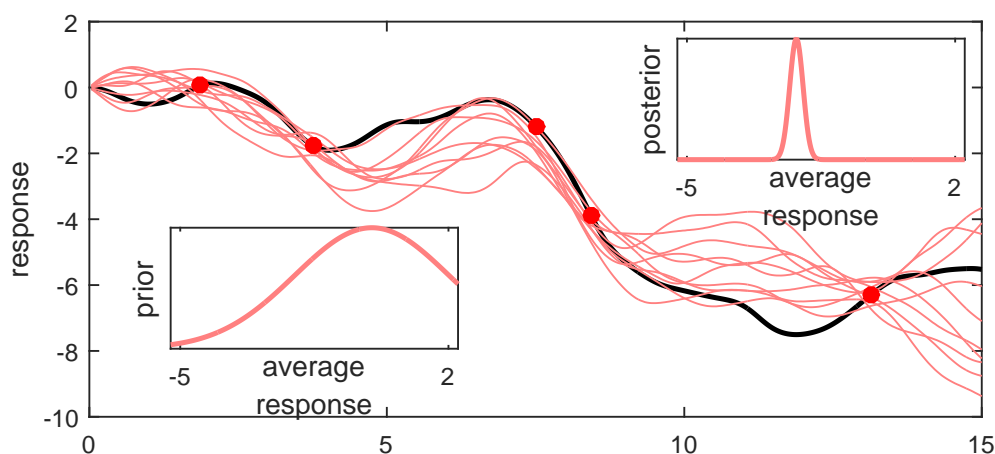# IOE 591
Bayesian Data Analysis

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Have you ever wondered what to do when your dataset does not agree with the standard statistical assumptions? Have you ever wondered "is there a statistical test for that" and sadly not found one? As data analysis becomes more ubiquitous, questions have been raised about the adequacy and efficacy of traditional estimation and prediction using statistical models. These inquiries have become especially common when we have existing scientific knowledge that does not translate into the ubiquitous statistical assumptions (such as homogenous and independent data generation).

This new course, "Bayesian Data Analysis," details the principles of data analysis through a Bayesian lens with modern, computation-based statistical modeling. The course is for anyone who wants to learn Bayesian statistics through basic calculus and computer simulation (and a maybe a tiny bit of theory). The major goals for the class are:

1. To understand the basics of the Bayesian approach to inference through conditional probability.
2. To introduce the computational approach to estimation and interpretation of Bayesian models.
3. To couple the basics of Bayesian statistics with the practice of statistical graphics and communication.

Skeleton Syllabus

Motivation for Bayesian ; Basics of priors; Graphical and Hierarchical models; Generalized linear models; Group comparisons; Bayesian model evidence; Computational aspects of Bayesian Inference; Introduction to nonparametric Bayesian ideas.
Time: Fall 2016, MW, 10:30am-12:00pm **Prerequisite(s):** Stat 500 or equivalent
Text: Gelman, Arlin, Stern, Dunson, Vehtari, Rubin (2013). *Bayesian Data Analysis*. 3rd Ed. Wiley. ISBN 978-1439840955.