Biostatistics 682:
Applied Bayesian Inference
Winter 2017

Instructor: Timothy D. Johnson
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Office Hours: TBA

Lecture: Monday/Wednesday 11:40 am –1:00 pm, Room: SPH II M1020
NOTE: No class on Jan 16, (MLK Day)
NOTE: No class on Feb 27, Mar 1 (Winter Break)
and Mar. 13 (ENAR)

Grading: **Homework:** (30%)
            Midterm: TBA (30%)
            Project: TBA (40%)

Text: No Required Text
Recommended Texts:

Bayesian Data Analysis, 3rd edition
Andrew Gelman, John B. Carlin, Hal S. Stern, David B. Dunson,
Aki Vehtari, Donald B. Rubin
CRC Press, 2014

Bayesian Biostatistics
Emmanuel Lesaffre, Andrew B. Lawson
Wiley, 2012

Bayesian Ideas and Data Analysis
Ronald Christensen, Wesley Johnson, Adam Branscum, Timothy E. Hanson
CRC Press, 2011

Bayesian Modeling with WinBUGS
Ioannis Ntzoufras
Wiley, 2009

Software: R and WinBUGS
http://www.r-project.org/
http://www.mrc-bsu.cam.ac.uk/software/bugs/the-bugs-project-winbugs/

Course Description: This course surveys theory and methods for the analysis of data within the Bayesian Paradigm. I will closely follow the material in Bayesian Data Analysis. This book is not required, but recommended. Topics that may be covered include: Goal of statistical inference, the role of probability, foundations of Bayesian inference, formulation of appropriate models for Bayesian inference and specification of prior densities, analytical and numerical approximation techniques, asymptotic approximation of posterior distributions and connections with maximum likelihood inference, relations between Bayesian and classical inference, model choice and diagnosis, sensitivity analysis, iterative simulation techniques for Bayesian analysis (MCMC), and application of Bayesian inference in real scientific problems. Examples will be illustrated in WinBUGS and R.

Since this year's class if very large (currently 95 enrolled) final projects will be team projects. I will assign 2-3 students per team. The project will consist of a Bayesian analysis of a data set selected by the students. The project will have to be approved by the instructor. Project proposals will be due before spring break (details TBA). The final project will be a 5 page, double space, 12 pt font, 1 inch margin, typed paper. A maximum of 2 tables and 4 figures are allowed.

Academic Integrity: The faculty of the School of Public Health believes that the conduct of a student registered or taking courses in the School should be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty members, guest lecturers, administrative support staff, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions and striving to help them achieve maximum benefits from their experience in the School.

Student academic misconduct refers to behavior that may include plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials (including library materials), and aiding and abetting the perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each students own effort. Reference sources should be indicated clearly. The use of assistance from other students or aids of any kind during a written examination, except when the use of aids such as electronic devices, books or notes has been approved by an instructor, is a violation of the standard of academic conduct (Standard of Academic Conduct, University of Michigan School of Public Health).