STT 465 - 001: Bayesian Statistical Methods, Fall 2019

Instructor: Leonard Johnson
E-mail: john2772@msu.edu
Class Hours: M W F 10:20 - 11:10am
Office Hours: M W 2:00 - 3:00 p.m.
Classroom: 118 FAE Hall
Web: www.d2l.msu.edu/home/831566
Office: C410 Wells Hall
Phone: 517-355-3287

Course Description

The specific topics of this course includes probability, belief and exchangeability, objective and subjective empirical Bayes approach, application to one-parameter models, linear regression models, multivariate normal models, Hierarchical models and computational methods. The course will cover chapters 1-6, 9-10 and 12 of the required textbook. All computational examples will be implemented in R (http://www.r-project.org).

I encourage all to download R and R Studio in preparation for this class. We will get some brief introduction to R but I will NOT be teaching R in the class. We will also discuss examples that might be challenging to understand. Please review STT 180/301/191 materials.

Required Materials

- **Textbook:** A First Course in Bayesian Statistical Methods, Peter D. Hoff, Springer.
- **Graphing Calculator:** Graphing calculator with probability distribution capacity.

Prerequisites

- STT 442 or equivalent courses.

Grading Policy

Final grades will be based on homework (30%), two exams (25% each), Final project (15%) and attendance (5%).Collaboration in homework is welcome; however, each student MUST submit his or her individual and sufficiently unique work. A zero grade will be given to students with identical home work.

Percentage	90-100	80-89	70-79	65-69	60-64	55-59	50-54	0-49
Grade	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.0

Course Policies

During Class

No cell phone use in call. Phone should be in silence mode. Courtesy is extremely important in maintaining effective learning environment. Please be respectful of the individual rights to learn of your colleagues.

Attendance Policy

You are expected to attend all lecture. Attendance will be taken at the discretion of the instructor.

Academic Integrity and Honesty

The Department of Statistics and Probability adheres to the policies of academic honesty as specified in the General Student Regulations 1.0, Protection of Scholarships and Grades, and in the All-University of Integrity of Scholarship and Grades which are included in Spartan Life: Student Handbook and Resource Guide.

ADA: To arrange for accommodation a student should contact the Resource Center for People with Disabilities at (517)353-9642 or http://www.rcpd.msu.edu/

Disclaimer: The instructor reserves the right to make changes to the syllabus and those changes will be communicated to the class on the course website.

Schedule and weekly learning goals

The schedule is tentative and subject to change.

Week 00, 08/28 – 08/30: Statistical Inference: Frequentist and Bayesian, Beliefs and Probability (Chap 2)

Week 01, 09/02 - 09/06: **Monday (no class**), Intro to R, Belief and Probability

Week 02, 09/09 - 09/13: The Beta-Binomial Model & Poisson-Gamma Model (Chap 3)

Week 03, 09/16 - 09/20: No Class but Assigned reading (Workshop & Talk)

Week 04, 09/23 - 09/27: Predictive Distribution (Chap 3&4)

Week 05, 09/30 - 10/04: Normal Model (Chap 5)

Week 06, 10/07 - 10/11: Gibbs Sampler in the Normal Model, & **Exam 1 (Oct 07 2019, 10:20am-11:10am)**

Week 07, 10/14 - 10/18: Least square in SLR and in MLR (Chap 9)

Week 08, 10/21 - 10/25: Least square in MLR (cont'd)

Week 09, 10/28 - 11/01: Bayesian Multiple Linear regression with flat prior (Chap 10 & 11)

Week 10, 11/04 - 11/08: Bayesian Multiple Linear regression with informative prior (Chap 10 & 11)

Week 11, 11/11 - 11/15: Logistic Regression, MLE and Inference

Week 12, 11/18 - 11/22: Logistic Regression, MLE and Inference (Cont'd)

Week 13, 11/25 - 11/29: Bayesian Logistic Regression using Metropolis Hastings, & **Exam 2 (Nov 27 2019, In class), Thanksgiving break 09-28&29**

Week 14, 12/02 - 12/06: Bayesian Logistic Regression using Metropolis Hastings (cont'd)

Week 15, 12/10 - 12/14: **Final Exam (Dec 13 2019, 7: 45am-9:45am) – Final Project Due @ 10:00 a.m. in my office**