STAT:7520 (22S:238): BAYESIAN ANALYSIS

Spring 2016

TIME AND LOCATION:

Monday, Wednesday and Friday from 2:30–3:20 PM in 150 SH

PREREQUISITES:

22S:164 (STAT:5200), 22S:166 (STAT:5400), and 22S:194 (STAT:5101).

INSTRUCTOR:

Joyee Ghosh, Dept. of Statistics and Actuarial Science
Office: 372 SH; Phone: 335-0816; E-mail: joyee-ghosh@uiowa.edu

OFFICE HOURS:

Monday 3:45–5:00 PM, Tuesday 2:00–3:15 PM, Friday 3:45–4:15 PM, or by appointment.

DEO:

Professor Joseph B. Lang; Office: 241 Schaeffer Hall; Phone: 335-0712;
Email: joseph-lang@uiowa.edu

TEXTBOOK:

Required: Bayesian Data Analysis, Andrew Gelman, John B. Carlin, Hal S. Stern, David B. Dunson, Aki Vehtari and Donald B. Rubin, Chapman & Hall/CRC Text in Statistical Science, 3rd ed.

ICON:

ICON will be used for posting grades, assignments etc. All students registered for the course should have access.

COURSE INFORMATION:

Goals

We aim to give a relatively comprehensive treatment of the statistical analysis of data from a Bayesian perspective. Different models will be considered, including linear regression models, hierarchical models, and generalized linear models. Issues of model formulation, computation, model checking, and sensitivity analysis will be considered, and illustrated with real statistical analyses.

Description

We will try to cover chapters 1-6, 9-11, 14, and 16 of the textbook, not necessarily in this order. We may also cover other topics as time permits.

COMPUTING:

We will mainly use the statistical language `R` for this course, which can be downloaded from `http://cran.us.r-project.org/`.

GRADING:

A plus-minus grading system will be used. As a rough guide A,A-: 88% –100%, B+,B,B-: 70%–88%, C+,C,C-: 50-70%. I may lower the cut-offs depending on the difficulty of the exams.

- Homework assignments (20%)
- Project (10%)
- Midterm exam (35%)
- Final exam (35%)

Homework assignments

I expect to give homework assignments every 2-3 weeks covering theory and/or applied problems. You can discuss homework assignments with me or other students, but the final write-up should be from your own understanding.

Project

For the project I will post a few papers later in the semester. Your task would be to read a paper and present it to your classmates using pdf/powerpoint slides. I will ask you to rank the papers according to preference to decide which paper gets assigned to whom. If a particular paper is selected by multiple students, I will randomly assign it to one of them, so there will be a bit of randomness. I selected the papers according to the mathematical and computational level of this class, so hopefully none of them would be difficult to present.

The main goal of this project would be to demonstrate that you can independently read a paper in a mainstream journal in statistics (JASA, Annals of Applied Statistics, The American Statistician etc.), and that you can summarize and present the key concepts to an audience who

may not be familiar with that particular area in Bayesian statistics. I expect you to focus on the big picture than spending all your time trying to understand every minute detail (if you do understand all details that's terrific). Some points that you want to think about for your presentation are: why is this an important topic/contribution, what are the challenges in the problem the authors are trying to address, what is the novelty in the paper, what are possible applications of the methods, what are some of the limitations, etc.

The presentations will most likely be in the week April 25–29, 2016 or around that week. I will create a dropbox on ICON to submit your slides before the presentation. I will post more details about how much time each student will get when we are closer to the date.

Exams

There will be a `closed` book 50 minutes midterm exam in class, tentatively on Friday, March 11, 2016. You may bring a $8.5'' \times 11''$ hand-written formula sheet (both sides).
There will be a `closed` book two hours comprehensive final exam (date to be announced later). You may bring two $8.5'' \times 11''$ hand-written formula sheets (both sides).
If an exam is missed, a make-up exam will be permitted only if the circumstances of missing the exam satisfy university policy (documentation will be required in such a case).

LATE WORK AND ABSENCES:

Barring illness and family emergencies, credit will not be given for late work. If you have to miss a class, please read the material covered on that day before coming to the next class. This will help you get the most out of lectures.

College of Liberal Arts and Sciences: Policies and Procedures

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Student Academic Handbook.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences. (Operations Manual, III.15.2. Scroll down to k.11.)

Accommodations for Disabilities

A student seeking academic accommodations should first register with Student Disability Services and then meet privately with the course instructor to make particular arrangements. See www.uiowa.edu/∼sds/ for more information.

Academic Honesty

All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (see CLAS Academic Policies Handbook).

CLAS Final Examination Policies

The final examination schedule for each class is announced by the Registrar generally by the tenth day of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.

Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit the instructor, then the course supervisor, and then the departmental DEO. Complaints must be made within six months of the incident. See the CLAS Student Academic Handbook.

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Comprehensive Guide on Sexual Harassment for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Public Safety web site.