

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

Spring 2021

CLASS MEETINGS:

M/W/F 2:30–3:20 PM.

COURSE MODALITY:

Lectures will be given during the class time via Zoom lecture link on ICON. Office/drop-in hours will be held via Zoom office hours link on ICON. Zoom sessions for lectures or office hours will not be recorded.

INSTRUCTIONAL BREAK:

There will be no lecture/office hour/due date etc. on “Instructional Break” days: Tuesday, March 2, and Wednesday, April 14.

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/DROP-IN HOURS:

M 3:40–5:10 PM, W 5:40–6:40 PM, F 3:40–4:10 PM, or by appointment.

DEO:

Professor Kung-Sik Chan; Office: 241 Schaeffer Hall; Phone: 335-2849;
Email: kung-sik-chan@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%, F:< 50%. I may lower the cut-offs depending on the difficulty of the exams.

- Homework assignments (25%)
- Presentation (15%)
- Midterm exam (25%)
- Final exam (35%)

Homework assignments

I plan 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.

Presentation

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 each student 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 will select 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 would be to demonstrate that you can independently read a paper in a mainstream journal in statistics (Journal of the American Statistical Association, Annals of Applied Statistics, Bayesian Analysis, 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 of April 26 or around that week. 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 50 minutes midterm exam in class, tentatively on Friday, March 19. There will be a two hours comprehensive final exam (date to be announced later).

Exams will be closed internet/computer/phone/tablet etc. but open hard copy resources (written/printed notes, book etc.). You are not required but strongly encouraged to prepare a handwritten formula sheet for better time management during the exams.

If an exam is missed, a make-up exam will be permitted only if the circumstances of missing the exam satisfy university policy.

LATE WORK AND ABSENCE:

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. Please talk with me and make arrangements ahead of time, if you need to miss a class due to mandatory religious obligations.

College of Liberal Arts and Sciences: Policies and Procedures

Absences and Attendance

Students are responsible for attending class and for contributing to the learning environment of a course. Students are also responsible for knowing their course absence policies, which will vary by instructor. All absence policies, however, must uphold the UI policy related to student illness, mandatory religious obligations, including Holy Day obligations, military service obligations, unavoidable circumstances, or University authorized activities. Students may use the CLAS absence form to aid communication with the instructor who will decide if the absence is excused or unexcused. The form is on ICON in the top banner under “Student Tools.” More information is at <https://clas.uiowa.edu/students/handbook/attendance-absences>.

Academic Integrity

All undergraduates enrolled in courses offered by CLAS have, in essence, agreed to the College’s Code of Academic Honesty. Misconduct is reported to the College, resulting in suspension or other sanctions, with sanctions communicated with the student through UI email. Visit this page for information: <https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code>.

Accommodations for Disabilities

UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as mental health, attention, learning, vision, and physical or health-related condition) by registering with Student Disability Services (SDS). The student is then responsible for discussing specific accommodations with the instructor. More information is at <https://sds.studentlife.uiowa.edu/>.

Administrative Home of the Course

The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and related policies. Other colleges may have different policies. CLAS policies may be found here: <https://clas.uiowa.edu/students/handbook>.

Classroom Expectations

Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the Code of Student Life . This includes related UI policies and procedures that all students have agreed to regarding the COVID-19 pandemic. Particularly, each student must wear a face mask when in a UI building, including a classroom. The density of seats in classrooms has been reduced, and in some instances, this will allow 6 feet or more of distance while other cases, it may be less. Regardless, wearing a face mask and maintaining as much distance as is possible are vital to slowing the spread of COVID-19. In the event that a student disrupts the classroom environment through the failure to comply with a reasonable directive of an instructor or of the University, the instructor has the authority to ask that the student to leave the space immediately for the remainder of the class period. Additionally, the instructor is asked to report the incident

to the UI Office of Student Accountability, with the possibility of additional follow-up with the student. Students who need temporary alternative learning arrangements (TALA) for a future semester related to COVID-19 should visit this website for more information:

Class Recordings: Privacy and Sharing

Some sessions of a course could be recorded or live-streamed. Such a recording or streaming will only be available to students registered for the course. These recordings are the intellectual property of the faculty, and they may not be shared or reproduced without the explicit **written** consent of the faculty member. Students may not share these sessions with those not in the class; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and, in some cases, a violation of the Federal Education Rights and Privacy Act (FERPA).

Communication and the Required Use of UI Email

Students are responsible for official correspondences sent to their UI email address (uiowa.edu) and must use this address for all communication within UI (Operations Manual, III.15.2).

Complaints

Students with a complaint about an academic issue should first visit with the instructor or course supervisor and then with the Chair of the department or program offering the course; students may next bring the issue to the College of Liberal Arts and Sciences; see this page for more information: <https://clas.uiowa.edu/students/handbook/student-rights-responsibilities>.

Final Examination Policies

The final exam schedule is announced around the fifth week of classes; students are responsible for knowing the date, time, and place of a final exam. Students should not make travel plans until knowing this information. No exams of any kind are allowed the week before finals with very few exceptions made (for labs, ESL and some world language courses, and off-cycle courses): <https://registrar.uiowa.edu/final-examination-scheduling-policies>.

Nondiscrimination in the Classroom

The University of Iowa is committed to making the classroom a respectful and inclusive space for people of all gender, sexual, racial, religious, and other identities. Toward this goal, students are invited in MyUI to optionally share the names and pronouns they would like their instructors and advisors to use to address them. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity (<https://diversity.uiowa.edu/eod>; +1 319 335-0705).

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 must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, please see <https://osmrc.uiowa.edu/>.