

# STAT:4520 BAYESIAN STATISTICS

Fall 2021

## **TIME AND LOCATION:**

Lectures: Monday, Wednesday, and Friday from 10:30–11:20 AM in W207 PBB

## **PREREQUISITES:**

STAT:3200 and (STAT:3101 or STAT:4101 or STAT:3120)

## **INSTRUCTOR:**

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

## **ZOOM OFFICE HOURS:**

Monday 2:00–4:00 PM, Wednesday 1:35–2:00 PM, Friday 1:35–2:10 PM, or by appointment. You are welcome to “walk in” that is drop by in Zoom during office hours without prior appointment.

## **DEO:**

Professor Kung-Sik Chan; Office: 241 Schaeffer Hall; Phone: 335-0712;  
Email: kung-sik-chan@uiowa.edu

## **TEXTBOOK:**

Required: Probability and Bayesian Modeling, Albert and Hu (Bookdown version available at <https://bayesball.github.io/BOOK/probability-a-measurement-of-uncertainty.html>)

Supplementary: Applied Bayesian Statistics, Cowles (free version available at <https://login.proxy.lib.uiowa.edu/login?url=https://link.springer.com/book/10.1007%2F978-1-4614-5696-4>)

Supplementary: A First Course in Bayesian Statistical Methods, Hoff (free version available at <https://login.proxy.lib.uiowa.edu/login?url=https://link.springer.com/book/10.1007%2F978-0-387-92407-6>)

## **ICON:**

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

## **COURSE INFORMATION:**

### **Goals**

Students will learn to do statistical analysis of data from a Bayesian perspective. Different models will be considered, including linear regression models, hierarchical models, and logistic regression models. Issues of model formulation, computation, model checking, and sensitivity analysis will be considered, and illustrated with real statistical analyses. Students will learn to use software packages and R for carrying out Bayesian data analysis.

### **Description**

Tentatively, the plan is to cover chapters 7 through 13 of the textbook, and additional topics if time permits.

## **SOFTWARE:**

We will use the statistical language R for this course, which can be downloaded from <https://cran.r-project.org/>.

## **GRADING:**

A plus-minus grading system will be used. As a rough guide A,A-: 88-100%, B+,B,B-: 75-88%, C+,C,C-: 50-75%, D+,D,D-: 40-50%, F:<40%. I may lower the cut-offs depending on the difficulty of the exam. The A+ grade is rarely awarded.

- Homework assignments (15%)
- Two Midterm exams (25% each)
- Final exam (35%)

### **Homework assignments**

I expect to give homework assignments almost every week. I will usually assign the homework on Wednesday and it will be due on ICON the following Wednesday.

HW should show name and HW number written at the top of the first page. Please upload HW as Word or PDF documents. You may take a picture of your handwritten HW and embed in Word. If you have an iPhone, you can use the “Notes” app to create a new note. Choose the camera icon and then select “Scan Documents”. This automatically saves all the scanned handwritten pages in a single PDF file. Please be considerate to the grader and double check that your uploaded scanned documents are readable (not too small or large fonts etc.).

You can discuss homework assignments with me or other students, but the final write-up should be from your own understanding. While assignments do not have to

be type-written, please provide figures or R code, when applicable. For written problems always show your work, not just the final answer.

### **Exams**

There will be two **closed** book 50 minutes midterm exams in class, in the weeks of October 6, 2021 and November 10, 2021 tentatively. You may bring a  $8.5'' \times 11''$  hand-written formula sheet (write on one side only) to midterm exams.

There will be a **closed** book two hours final exam (date to be announced later). You may bring three  $8.5'' \times 11''$  hand-written formula sheets (write on one side only). 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).

### **EXTRA HELP:**

The Statistics Tutorial Lab gives free tutorial assistance to students in some elementary Statistics courses. In addition, several graduate students have volunteered to independently tutor students in various Statistics courses at mutually arranged times and fees. Please check the web site <https://stat.uiowa.edu/resources/tutoring> for tutoring details.

### **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.

### **CLASSROOM ENVIRONMENT:**

Activities which are unacceptable are (1) prolonged conversation with a fellow student, (2) the use of cell phones, and (3) the use of laptops/tablets etc. in class, unless you are asked to bring laptops to a particular class. **Please remember to switch your phones to silent mode before class starts and put away laptops/tablets/phones etc. when in class.**

# College of Liberal Arts and Sciences: Policies and Procedures

## **ATTENDANCE AND CLASSROOM EXPECTATIONS**

Students are responsible for attending class and for knowing an instructor's attendance policies, which vary by course and content area. All students are expected to attend class and to contribute to its learning environment in part by complying with University policies and directives regarding appropriate classroom behavior or other matters.

## **ABSENCES**

Students are responsible for communicating with instructors as soon they know that an absence might occur or as soon as possible in the case of an illness. Delays in communication could result in a forfeit of what otherwise might be an excused absence.

## **ABSENCES: ILLNESS, UNAVOIDABLE CIRCUMSTANCES, AND UNIVERSITY SPONSORED ACTIVITIES**

Students who are ill, in an unavoidable circumstance affecting academic work, or who miss class because of a University sponsored activity are allowed by UI policy to make up a missed exam. Documentation is required by the instructor except in the case of a brief illness. Students are responsible for communicating with instructors as soon as the absence is known (<https://opsmanual.uiowa.edu/students/absences-class#8.1>).

## **ABSENCES: HOLY DAYS**

Reasonable accommodations are allowed for students whose religious holy days coincide with their classroom assignments, tests, and attendance if the student notifies the instructor in writing of any such religious Holy Day conflicts within the first days of the semester and no later than the third week. (See the University Operations Manual: <https://opsmanual.uiowa.edu/students/absences-class#8.2>).

## **ABSENCES: MILITARY SERVICE OBLIGATIONS**

Students absent from class due to U.S. veteran or U.S. military service obligations (including military service-related medical appointments, military orders, and National Guard Service obligations) must be excused without penalty. Instructors must make reasonable accommodations to allow students to make-up exams or other work. Students must communicate with their instructors about the expected possibility of missing class as soon as possible. (For more information, see <https://opsmanual.uiowa.edu/iv-8-absences-class%C2%A0-0>).

## **ACADEMIC MISCONDUCT**

Plagiarism and the process for addressing academic misconduct of graduate students are defined in Section IV, Article F "Plagiarism by Graduate Students" of the UI Graduate College Manual of Rules and Regulations. Please contact the CLAS Associate Dean for Graduate Education for any necessary assistance in navigating the process mandated by the Graduate College.

## **ACADEMIC ACCOMMODATIONS**

UI is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as a mental health, attention, learning, vision, and a physical or health-related condition) through the Student Disability Services (SDS) office. The student is responsible for discussing specific accommodations with the instructor. Note that accommodations are not granted retroactively but from the time of the student's request to the instructor onward; additionally, accommodations must be requested at least two weeks in advance of the related assignment or exam (<https://sds.studentlife.uiowa.edu/>). Graduate students serving as Teaching Assistants, Research Assistants, or Fellows must contact Faculty and Staff Disability Services (<https://hr.uiowa.edu/support/faculty-and-staff-disability-services>) for assistance with accommodations.

## **CLASS RECORDINGS: PRIVACY AND SHARING**

Course lectures and discussions are sometimes recorded or live-streamed. These are only available to students registered for the course and the intellectual property of the faculty member. These materials may not be shared or reproduced without the explicit written consent of the instructors. Students may not share these recordings with those who are not enrolled in the course; likewise, students may not upload recordings to any other online environment. Doing so is a breach of the Code of Student Conduct and could be a violation of the Federal Education Rights and Privacy Act (FERPA); also see <https://dos.uiowa.edu/policies/code-of-student-life/>.

## **COMMUNICATION: UI EMAIL**

Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community (Operations Manual, III.15.2). Emails should be respectful and brief, with complex matters addressed during the instructor's drop-in hours, for example. Faculty are not expected to answer email after business hours or during the weekends.

## **FREE SPEECH AND EXPRESSION**

The University of Iowa supports and upholds the First Amendment protection of freedom of speech and the principles of academic and artistic freedom. We are committed to open inquiry, vigorous debate, and creative expression inside and outside of the classroom. Visit Free Speech at Iowa for more information on the University's policies on free speech and academic freedom: <https://freespeech.uiowa.edu/>.

## **COMPLAINTS ABOUT ACADEMIC MATTERS**

Students with a complaint about a grade or a related academic matter should first visit with the instructor and then with the course supervisor (if applicable), and finally with the director of the school, department, or program offering the course. If a graduate student has not been able to resolve the issue through the director of the school, department, or program, they should contact the associate dean for graduate education in the College of Liberal Arts and Sciences.

## **FINAL EXAMINATION POLICIES**

The final exam schedule is published during the fifth week of the fall and spring semesters or on the first day of summer classes; students are responsible for knowing the date, time, and place of their final exams. Students should not make travel plans until knowing this information. A student with exams scheduled on the same day and time or who have more than two final exams on the same day should visit this page for how to resolve these problems by the given deadline (<https://registrar.uiowa.edu/makeup-final-examination-policies>). No exams are allowed the week before finals, but with some exceptions made for labs, language courses, and off-cycle courses (<https://registrar.uiowa.edu/final-examination-scheduling-policies>).

## **HOME OF THE COURSE**

The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the policies and procedures for its courses. Graduate students, however, must adhere to the academic deadlines set by the Graduate College. See <https://grad.uiowa.edu/academics/deadlines>.

## **MENTAL HEALTH**

Students are encouraged to seek help as a preventive measure or if feeling stressed or overwhelmed. Students should talk to their instructors for guidance with specific class-related concerns and are encouraged to contact University Counseling Service (UCS) at 319-335-7294 during regular business hours to schedule an appointment. UCS offers group and individual therapy as well as counseling for couples about relationships while making referrals to other resources (<https://counseling.uiowa.edu/>). Student Health can also address related concerns (<https://studenthealth.uiowa.edu/>). These visits are free to students. After hours, students are encouraged to call the Johnson County Community Crisis Line at (319) 351-0140 or dial 911 in an emergency.

## **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 based on race, class, gender, sexual orientation, national origin, and other identity categories indicated by the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity at <https://diversity.uiowa.edu/division/oie>.

## **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 are expected to conduct themselves in a manner that maintains an environment free from sexual harassment and sexual misconduct. Those experiencing Incidents of sexual harassment are strongly encouraged to report incidents and to seek help (<https://osmrc.uiowa.edu/>).