Statistics 3101
Introduction to Mathematical Statistics II
Spring 2020

Instructor: Professor Colin Lewis-Beck
Office: 256 Schaeffer Hall
Phone: (319) 335-2058
Email: colin-lewis-beck@uiowa.edu

Office Hours: Monday 2:30 - 4:00 pm and Wednesday 2:30 - 4:00 pm

Teaching Assistant: Haiyang Zhu
Email: haiyang-zhu@uiowa.edu

Lecture: MWF 8:30 – 9:20 am (MB 112) and 10:30 – 11:20 am (W207 PBB)

Course web page: ICON

Final Exam Calendar: TBA

Required Materials


2. R software (open source, for more information see: http://www.r-project.org and Computing section below)

Course Description

The objective of this course is to develop and foster analytical skills that will allow you master the following statistical concepts: transformations of random variables; sampling distributions; confidence intervals and hypothesis testing; theory of estimation and hypothesis tests; linear model theory; use of the R statistical package for simulation and data analysis. This material roughly corresponds to Ch 5 - 8 of the textbook.

Exam dates (tentative):

Exam 1 Friday, March 6
Exam 2 Friday, April 17
Final Exam** TBA

**The Final Exam is comprehensive. Final Exams cannot be taken early!

Grading

Final letter grades (on plus/minus scale) are determined from: Final Numeric Grade =

0.20 × HW% + 0.10 × Quiz% + 0.20 × Exam1% + 0.20 × Exam2% + 0.30 × Final Exam%
Course Information and Procedures

Course Objectives

At the **metacognitive** level:

1. Monitor your own mindful and meaningful effort for learning. Develop habits of thinking relevant to the understanding of the theory of statistics with focus on statistical inference.

2. Work effectively individually and with your peers to accomplish course-required tasks.

At the **statistical** level:

1. Understand and make simple applications of both classical and decision-theoretic approaches to modern probability-based prediction and parametric statistical inference problems (including Bayes analysis).

2. Understand and apply some of the available methods (both analytical and simulation-based) for finding derived distributions in probability models (including simple ideas of limiting distributions, simulation for Bayesian posteriors, and bootstrap distributions).

3. Apply some of the results in 2) to justify methods of elementary statistical inferences for means, standard deviations, and proportions. Also, apply statistical inference to linear models.

4. Understand and apply likelihood-based data reduction/feature selection and estimation results for parametric inference.

5. Understand and apply statistical optimality theory for simple-versus-simple hypothesis testing.

Reading assignments

Reading assignments will not be given explicitly but you are expected to read the textbook on a weekly basis focusing on the chapters that are currently being covered in class.

Homework Assignments

Expect one Homework Assignment every 1 to 2 weeks (approximately 10 ±2 assignments).

- Homework assignments will be posted on ICON. **Late submissions will not be accepted.**

- Written assignments will be due **in class** on the specified date. I will typically make assignments due on a Friday but may change the day to accommodate the lecture pace.

- I will drop your **lowest** scoring homework assignment. This score is based on percentages.

Quiz

There will be approximately 5 ±2 in class quizzes. These will be open book/note and take about 20 minutes to complete. I will drop your **lowest** quiz score based on percentages.
Exams

Exams will be completed during the lecture periods on the assigned dates provided on this syllabus. Note that the dates are tentative.

Computing

R is a statistical software, which will be used occasionally, mostly for homework assignments. I will provide instructions on how to use R related to the material we are covering in class but also expect you to be able to modify R code to complete homework assignments. R is free and can be downloaded to your own computer. See ICON for instructions on downloading R. Detailed instructions on using R will be provided with all assignments. Be sure to allow enough time to complete all homework assignments. It is your responsibility to allow for computer failures and/or difficulty finding a computer with the R software.

Course communication

I will do my best to answer email questions within 24 hours. Here are a few suggestions to ensure I answer your email:

- Check the syllabus/announcements/slides before emailing; try to figure things out yourself first.
- Start your email by addressing me (Dear/Hi Professor Lewis-Beck).
- Be clear and concise.
- Use correct spelling and proper grammar.
- Be polite when making requests - do not make demands.
- End your email with a closing and your name.

General Outline for Course Material: Below is a general outline of the course material covered in Stat 3101 and the weeks allotted to each topic. This schedule is subject to change throughout the semester.

Schedule of Topics

- Review of random variables, transformations - Week 1-2
- Order statistics - Week 3
- Sampling distributions - Week 4
- Point estimation - Weeks 5 and 6
- Properties of point estimators - Weeks 7 and 8
- Inference for regression analysis - Weeks 9 and 10
- Interval estimation - Weeks 11 and 12
- Bayesian statistics - Weeks 13 and 14
- Hypothesis testing - Weeks 15
Miscellaneous

- Administrative Home 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 other policies. These policies vary by college (https://clas.uiowa.edu/students/handbook).

- Electronic Communication 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).

- 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 should then discuss accommodations with the course instructor (https://sds.studentlife.uiowa.edu/).

- Nondiscrimination in the Classroom UI is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. 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 (diversity.uiowa.edu).

- 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 the UI email address (https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code).

- CLAS Final Examination Policies The final exam schedule for each semester 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 final exam information. No exams of any kind are allowed the week before finals (https://clas.uiowa.edu/faculty/teaching-policies-resources-examination-policies).

- Making a Complaint Students with a complaint should first visit with the instructor or course supervisor and then with the departmental executive officer (DEO), also known as the Chair. Students may then bring the concern to CLAS (https://clas.uiowa.edu/students/handbook/student-rights-responsibilities).

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

This syllabus is subject to change.