Instructor: Dr. Erning Li, 231 SH, 335-0820, erning-li@uiowa.edu

Office hours (drop-in hours): MWF 12:45–1:45 pm; and by appointment.

Grader: Xingyu (Jason) Zhou, xingyu-zhou@uiowa.edu

Department Information: Department of Statistics and Actuarial Science, 241 SH, 335-2082.
DEO: Professor Kung-Sik Chan, 241 SH, 335-0712, kung-sik-chan@uiowa.edu

Required Textbook:

Note: The required text is provided through ICON Direct and your U-Bill will be charged for this e-text, unless you opt out prior to the “tuition and fee reduction” course deadline. This semester, for standard 16 week courses, the Opt-Out deadline is January 31, 2022 at 6 pm CST.

Faculty are not responsible for providing students with alternative materials or waiving course requirements. I impose no restriction on the version (ebook, paper book, loose-leaf, or used) of the textbook that students obtain. Nearly all of the textbook contents will be covered in this course and many homework problems will be assigned from the textbook.

Lecture Notes: My lecture notes posted on ICON in advance will be intensively used. Students are strongly recommended to take additional notes in class.

ICON Course Website: Course materials such as syllabus, lecture notes, take-home assignments, grades, answer keys, etc. will be posted on ICON. Important announcements are emailed to the ICON class roster – Have your UIowa email address in the class roster and use it when corresponding with me via email (state the course number in your email).

Prerequisite: MATH:0100 basic algebra or equivalent.

Course Description and Objectives: Introduce students to basic statistical concepts and methods for summarizing, analyzing and presenting data and develop probabilistic reasoning and statistical solutions. Coverage includes visualizing and summarizing data, exploring relationships between variables, sampling survey, elementary probability models, sampling distributions, estimation and prediction, confidence intervals, hypothesis tests of significance, inference for relationships, correlation and regression, as well as basic statistical computing. This course will also emphasize applications and hands-on data visualization and analysis.

This is a General Education course in Quantitative or Formal Reasoning. Courses approved in this area have as their primary purpose the development of the analytical powers of the student as they might be exercised in presentation and evaluation of mathematical or other formal symbolic systems.

Upon completion of the course students are expected to

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• gain good understanding of statistical reasoning and logic of statistical inference;
• understand and interpret basic statistical analysis results;
• conduct basic data visualization and analysis using statistical software;
• appropriately deliver statistical findings.

R Software: Basic statistical computing using R will be taught and used in assignments.

R is open-source statistical software—one of the most popular and powerful for data analysis. It is freely available at https://www.r-project.org/ and can be downloaded to personal computer for free use. It is also available on the university Virtual Desktop and at the Instructional Technology Centers (ITCs) such as 41 SH.

See the instructions of R installation and an R introduction in ICON.

Homework: Regular homework will be assigned periodically in ICON; mostly week-long assignments. Students will turn in their assignment using file upload in ICON by its due date and time. Please submit your homework in Word doc, pdf files, or clear, readable scans/images of reasonable size. Please double check your submission each time, as points will be deducted if submission cannot be opened or read, or has missing pages.

Unless prior or prompt arrangements are made for reasons judged to be acceptable by Dr. Li, homework turned in after it is due will receive 0 (zero) credit. Additionally, as answer keys will be posted soon after the due date, late homework submission will only be considered in exceptional circumstances and with prior or prompt notification. All or only some of the problems (in case of time constraints) may be graded for correctness, but students are responsible for understanding all questions.

Students are allowed to discuss homework assignments, but everyone should write up their own individual answers and do their own individual calculations and programming. If “blind copying” in a student’s answer sheets is identified, all involved students will receive zero score and be considered as plagiarism. Discussions among students can be posted on the ICON Discussion Boards; notice that Discussion Board posts are public that everyone in the class will be able to read all of the posts and responses, and respond to them.

Exams and Quizzes:

Midterm Exam 1 tentatively Friday, February 25, in class.
Midterm Exam 2 tentatively Friday, April 8, in class.
Final Exam to be announced by the University.

The midterm exams are given at regular class meeting times.

You can bring one standard letter-size (8.5in × 11in) sheet of paper with anything you want written or typed on both sides to each midterm exam, and three such self-prepared help sheets to the final exam. Also bring a scientific calculator (any type) to each exam. Other than these, all exams are closed-book and closed-notes, unless instructed otherwise.

Any unexcused absence from an exam will result in a score of zero with no opportunity for a makeup. A makeup exam (different but equivalent to the original) will be considered only
with documentation of reasons required by the university policy and under prior or prompt arrangement made with Dr. Li, and it should be scheduled as soon as possible. The exam rules apply to all exams and makeup exams.

The final examination date and time will be announced by the Registrar generally by the fifth week of classes. It is your responsibility to know the date, time, and place of the final exam. Do not schedule your end-of-semester travel plans until the final exam schedule is announced by the University.

Prior to an exam, an online quiz may be given in ICON as a practice. All quizzes will be low-stakes.

**Grading:** A numerical overall score on the scale of 0 to 100 will be determined according to the following (tentative) breakdown

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Homework</td>
<td>16%</td>
</tr>
<tr>
<td>Low-stakes Quizzes</td>
<td>6%</td>
</tr>
<tr>
<td>Midterm exam 1</td>
<td>24%</td>
</tr>
<tr>
<td>Midterm exam 2</td>
<td>24%</td>
</tr>
<tr>
<td>Final exam</td>
<td>30%</td>
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</tbody>
</table>

Conversion of these scores into letter grades will be made according to the following scale:

- [90,100] A
- [80,90) B
- [65,80) C
- [50,65) D
- < 50 F

Plus (+) and minus (-) gradings will be given as deemed appropriate. At the discretion of Dr. Li, depending on class performance and attendance/participation in class, these ranges may be adjusted, but only downward - criteria will only become easier, not harder. A+ grade will be used only to indicate rare and extraordinary academic achievement.

**Integrity of Course Materials:** I request that you preserve the integrity of the course materials. This means that under no circumstance should you make public (either in print or via web postings, social networks, etc.) or disseminate any course materials such as lecture notes, handouts, homework and exam problems, and solutions, as well as other materials that I prepare. You must also strive to avoid making use of any solutions provided by anyone outside of this class. Compliance with this request will be considered part of the academic honesty requirements discussed further below under Administrative Policies.

**Attendance and Classroom Environment:** Attendance is very vital to your success in this course. Regular attendance is expected and roll may be taken on random days. Students who are absent from class without acceptable excuse should not seek help regarding missed lectures during my office hours.

When in class, please refrain from talking on cell phones, texting, using laptops/tablets (if not for note-taking purpose), and prolonged conversation with a fellow student. Wireless-capable devices such as laptops, tablets, smartphones, etc. must be put away during exams.

**Extra Help:**

- Statistics Tutorial Lab: Extra help beyond office hours is available for free at the Statistics Tutorial Lab for students in this course. During available times, a graduate student
will be present to assist you. Hours for the tutorial lab can be found at [https://stat.uiowa.edu/resources/tutoring](https://stat.uiowa.edu/resources/tutoring)

- Private For-Pay Tutors: The Department of Statistics and Actuarial Science maintains a list of private tutors at [https://stat.uiowa.edu/resources/tutoring](https://stat.uiowa.edu/resources/tutoring)

- Note that for qualified students, tutoring may be available through The Center for Diversity and Enrichment [https://diversity.uiowa.edu/division/center-diversity-and-enrichment-cde](https://diversity.uiowa.edu/division/center-diversity-and-enrichment-cde)

### Course Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Chapters</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Chapter 1</td>
<td>Introduction, R, displaying and describing data</td>
</tr>
<tr>
<td>2</td>
<td>Chapter 2</td>
<td>Displaying and describing data</td>
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<tr>
<td>3</td>
<td>Chapter 3</td>
<td>Relationships between categorical variables</td>
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<tr>
<td>4</td>
<td>Chapters 4, 5</td>
<td>Understanding and comparing distributions, standardize values, and shifting and scaling</td>
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<tr>
<td>5</td>
<td>Chapters 5, 6</td>
<td>Normal distributions, Normal probability plot, scatterplots and correlation</td>
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<tr>
<td>6</td>
<td>Chapter 7</td>
<td>Linear regression</td>
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<tr>
<td>7</td>
<td>Chapter 7</td>
<td>Midterm 1: Review and midterm exam 1 (covering Chapters 1–6)</td>
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<tr>
<td>8</td>
<td>Chapters 8, 10, 11</td>
<td>Regression wisdom, sample surveys, experiments and observational studies</td>
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<tr>
<td>9</td>
<td>Chapter 12</td>
<td>Probability</td>
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<tr>
<td>10</td>
<td>Chapter 12</td>
<td>Probability</td>
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<tr>
<td>11</td>
<td>Chapter 13</td>
<td>Sampling distribution</td>
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<tr>
<td>12</td>
<td>Chapter 13</td>
<td>Midterm 2: Review and midterm exam 2 (covering Chapters 7–8, 10–12)</td>
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<tr>
<td>13</td>
<td>Chapters 13, 14</td>
<td>Confidence interval for proportion, confidence interval for mean</td>
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<tr>
<td>14</td>
<td>Chapters 15, 16</td>
<td>Testing hypotheses, more about tests</td>
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<tr>
<td>15</td>
<td>Chapters 17, 18</td>
<td>Two-sample t tests, paired t test</td>
</tr>
<tr>
<td>16</td>
<td>Chapter 20</td>
<td>Inferences in linear regression, Chapter 19 chi-square test if time allows, and review for final</td>
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<tr>
<td></td>
<td><strong>Final exam</strong></td>
<td>(emphasizing Chapters 13–20 in detail and covering fundamental/big concepts throughout the semester)</td>
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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 or an unavoidable circumstance. Students can use the CLAS absence form to help communicate with instructors who will decide if the absence is excused or unexcused; the form is located on ICON within the top banner under "Student Tools." Delays by students in communication with an instructor could result in a forfeit of what otherwise might be an excused absence (https://clas.uiowa.edu/students/handbook/attendance-absences).

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
The University is prepared to make reasonable accommodations for students whose religious holy days coincide with their classroom assignments, test schedules, and classroom attendance expectations. Students must notify their instructors in writing of any such Religious Holy Day conflicts or absences within the first few days of the semester or session, and no later than the third week of the semester. If the conflict or absence will occur within the first three weeks of the semester, the student should notify the instructor as soon as possible. See Operations Manual 8.2 Absences for Religious Holy Days for additional information.

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%2CA0-0).

ACADEMIC MISCONDUCT
All undergraduates enrolled in courses offered by CLAS have in essence agreed to the College’s Code of Academic Honesty. Academic misconduct affects a student's grade and is reported to the College which applies an additional sanction, such as suspension. Outcomes about misconduct are communicated through UI email (https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code).

ACADEMIC ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES
The University is committed to providing an educational experience that is accessible to all students. If a student has a diagnosed disability or other disabling condition that may impact the student’s ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through Student Disability Services (SDS). SDS is responsible for making Letters of Accommodation (LOA) available to the student. The student must provide a LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated. The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Note that accommodations are not granted retroactively but from the time of the student’s request to the instructor onward. Additional information can be found on the SDS website.

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 are 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.

COMPLAINTS ABOUT ACADEMIC MATTERS
Students with a complaint about a grade or a related academic issue should first visit with the instructor and then with the course supervisor (if one is assigned), and next with the Chair of the department or program offering the course. If not resolved, students may bring their concerns to the College of Liberal Arts and Sciences: https://clas.uiowa.edu/students/handbook/student-rights-responsibilities.

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 may be scheduled the week before finals; some exception, however, have been made for labs, language courses, and off-cycle courses (https://registrar.uiowa.edufinal-examination-scheduling-policies).

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/).

HOME OF THE COURSE
The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the course’s add and drop deadlines, the “second-grade only” option (SG0), and other undergraduate policies and procedures. Different UI colleges may have other policies or deadlines. See https://clas.uiowa.edu/students/handbook. Questions? Contact CLAS at clasps@uiowa.edu or 319-335-2633.

MENTAL HEALTH
Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found at counseling.uiowa.edu. Find out more about UI mental health services at: mentalhealth.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.

NON-DISCRIMINATION STATEMENT
The University of Iowa prohibits discrimination in employment, educational programs, and activities on the basis of race, creed, color, religion, national origin, age, sex, pregnancy, disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, associational preferences, or any other classification that deprives the person of consideration as an individual. The university also affirms its commitment to providing equal opportunities and equal access to university facilities. For additional information on nondiscrimination policies, contact the Director, Office of Institutional Equity, the University of Iowa, 202 Jessup Hall, Iowa City, IA 52242-1316, 319-335-0705, oie-ui@uiowa.edu. Students may share their pronouns and chosen/preferred names in MyUI, which is accessible to instructors and advisors.
SEXUAL HARASSMENT
The University of Iowa prohibits all forms of sexual harassment, sexual misconduct, and related retaliation. The Policy on Sexual Harassment and Sexual Misconduct governs actions by students, faculty, staff and visitors. Incidents of sexual harassment or sexual misconduct can be reported to the Title IX and Gender Equity Office or to the Department of Public Safety. Students impacted by sexual harassment or sexual misconduct may be eligible for academic supportive measures and can learn more by contacting the Title IX and Gender Equity Office. Information about confidential resources can be found here. Watch the video for an explanation of these resources.