

STAT:3210 - Experimental Design & Analysis Spring 2021

Syllabus

Instructor: Dr. Erning Li

Office: 231 SH, Office phone: 335-0820, Email: *erning-li@uiowa.edu*

Class Meeting: MWF 10:30–11:20 am, January 25–May 7, 2021. There is no spring break, but two instructional breaks on Tuesday, March 2 and on Wednesday, April 14.

Lectures are synchronous online instruction via Zoom at the regular class meeting times; see Dr. Li's *lecture Zoom* meeting ID/link and password in ICON. Please join each Zoom lecture through ICON using your name as on the class roster. Each Zoom lecture will be recorded into ICON. Participation and engagement in course activities is vital to your success.

Office hours: MWF 11:45–12:15 and 1:45–2:15, and by appointment.

Conducted via Zoom; see Dr. Li's *office-hour Zoom* meeting ID/link and password in ICON. It is recommended that you email Dr. Li the specific meeting time you would like to request and Dr. Li will start the office-hour Zoom for you.

Grader: Mr. Tyler Reynolds *william-t-reynolds@uiowa.edu*

Feel free to contact the grader regarding questions about homework grading.

Department Information: Department of Statistics and Actuarial Science, 241 SH, Phone 335-2082

Departmental Executive Officer: Professor Kung-Sik Chan, 241 Schaeffer Hall, 319-335-0712, *kung-sik-chan@uiowa.edu*

Course Prerequisite: STAT:3200 and prior exposure to basic use of statistical programming software R.

Course Description and Objective: This course emphasizes practical aspects of experimental design and analysis. Both design and analysis of experiments as well as statistical computing (primarily R) are discussed. At the end of the semester, students should understand the principles, models and strategies commonly used for experimental design and data analysis, and be comfortable planning and analyzing experiments.

Main coverage: Basic principles of experimental design; Randomization; Completely randomized design; Paired design; Randomized blocks, Latin Squares, Greco-Latin Squares and related designs; Factorial design; Blocking in factorial design; 2^k factorial design; Extension of 2^k factorials; Blocking and confounding in 2^k factorials; Partial confounding; Fractional

factorial designs; Blocking in fractional factorials; Nested and split-plot designs; Replicated and un-replicated designs; Regression, ANOVA, and follow-up analysis; Power calculation; Sample size determination; Relative efficiency; Response surface; Random effects model.

ICON Course Website: Course materials including syllabus, lecture notes, homework assignments, answer keys, data, supplemental materials, grades, etc. will be posted on ICON <http://icon.uiowa.edu/>. Make sure your email address on ICON class roster is valid, as important class announcements are sent via ICON.

Lecture Notes: My lecture notes posted on ICON in advance will be intensively used.

Reference Book (recommended but not required):

Montgomery, D. C. (2017), *Design and Analysis of Experiments*, 9th edition, Wiley.
<http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP003675.html>

R Software: R computing is taught and used throughout the semester.

R is open-source statistical software—one 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 a review of R in ICON.

Regular 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.

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.

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, students involved in such incidence will receive zero score and be considered as plagiarism. Discussions 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:

Midterm Exam 1	<u>tentative</u> Wednesday, March 10, 10:30-11:20 am.
Midterm Exam 2	<u>tentative</u> Monday, April 19, 10:30-11:20 am.
Final Exam	TBD; final exam week May 10-14.

All the exams will be conducted online using ICON. The midterm exams are given at regular class meeting times. Exams are open book, but a calculator (any scientific type) and self-prepared crib sheets are strongly recommended. The work must be completely your own; any academic dishonesty (e.g., collaboration, outside help, etc.) is prohibited. Dr. Li will provide a detailed instruction of each exam in advance.

For purposes of proctoring an online exam, live-proctor via Zoom, and/or Respondus Lock-Down Browser, and/or Respondus Monitor (so web cam needed) may be implemented.

Missed exams may be made up only with documentation of reasons required by university policy and under prior arrangement made with Dr. Li. Any unexcused absence from an exam will result in a score of zero with no opportunity for a make-up.

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 final exam schedule.

Grading: A numerical final score on the scale of 0 to 100 will be determined according to the following tentative breakdown

Homework	15%
Midterm 1	27%
Midterm 2	27%
Final	31%

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.

At the discretion of Dr. Li, depending on class performance, these ranges may be adjusted, but only downward - criteria will only become easier, not harder.

Plus (+) and minus (-) gradings in each bracket will be given as deemed appropriate. 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 and book. 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 including lecture video recordings, 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.

UI and the College of Liberal Arts and Sciences
INFORMATION FOR UNDERGRADUATES

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>.

Class Behavioral Expectations

Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the [Code of Student Life](#). This includes the policies and procedures that all students have agreed to regarding the Steps Forward for Fall 2020 in response to the COVID-19 pandemic. Particularly, all students are required to wear a face covering when in a UI building, including a classroom. In addition, the density of seats in classrooms has been reduced; in some instances, this will allow 6 feet or more between students while other cases, it may be less. Regardless, wearing a face covering and maintaining as much distance as possible are vital to slowing the spread of COVID-19. In the event that a student disrupts the classroom environment through their failure to comply with the reasonable directive of an instructor or the University, the instructor has the authority to ask that the student immediately leave the space for the remainder of the class period. Additionally, the instructor is asked to report the incident to the [Office of Student Accountability](#) for the possibility of additional follow-up. Students who need a temporary alternative learning arrangement related to COVID-19 expectations should contact [Student Disability Services arrangements/](#); +1 319 335-1462)

<https://sds.studentlife.uiowa.edu/fall-2020/covid-19-temporary-learning-arrangements/>.

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 the 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 location 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 or diversity.uiowa.edu).

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/>.