STAT:3510:0AAA Biostatistics Spring 2025

(Cross References IGPI:3510:0AAA)

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

Office hours: MWF 1:00–2:00 pm, or by appointment.

Teaching Assistant (Lab/discussion instructor): Ying Xiang, *ying-xiang@uiowa.edu*

Office hours: TBA

Grader: Qian Tang, *qian-tang@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*

Class Meetings:

- **Lectures**: MWF 8:30A - 9:20A in 101 BBE

  Prof. Li will cover new materials during lectures.

- **Labs/Discussions**: Each student should have registered for one of the weekly lab/discussion sessions and will only need to attend that one session. The TA will lead discussions and demo R computing. The TA will also post lab/discussion materials in the ICON course website under "Modules" navigation.

  Basic statistical computing using R, an open-source statistical software, will be taught and used in assignments. It can be downloaded to personal computer for free from *https://www.r-project.org/*. It is also available on the university Virtual Desktop and at the Instructional Technology Centers (ITCs) such as 41 SH. See an introduction to R in ICON.

ICON Course Website: *https://icon.uiowa.edu/* (log into and choose this course)

- Course materials including syllabus, lecture notes, lab/discussion materials, homework assignments, online quizzes, grades, answer keys, etc. will be posted on ICON. See "Modules" regularly for updates.

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

- See "ICON Direct eTexts" for the eText.
- See "Assignments" for homework assignments and quizzes, and submit them by their deadlines.
- Communication: UI Email—have your UI email address in the class roster and use it when corresponding with Prof. Li via email (state the course number or title in your email). Important announcements to the class will be emailed via the ICON class roster.

Required Textbook:

***An Introduction to Biostatistics*, 3rd edition**, by Thomas Glover and Kevin Mitchell, 2016, Waveland Press. ISBN: 9781478627791. `https://www.waveland.com/browse.php?t=203`

Note: This textbook is provided through ICON Direct, access under "ICON Direct eTexts" in ICON, and your U-Bill will be charged for this e-text, unless you *opt out* *https://teach.its.uiowa.edu/icon-direct-opt-out* prior to the "tuition and fee reduction" course deadline (*https://registrar.uiowa.edu/course-deadlines*).

Faculty are not responsible for providing students with alternative materials or waiving course requirements. I impose no restriction on the version (e-book, 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 exercises from the textbook will be assigned.

Prerequisite: MATH:0100 or MATH:1005 or ALEKS score of 30 or higher.

Course Description and Objectives: Introduction to statistical concepts and methods for life, biological and health sciences; coverage includes descriptive statistics, introductory probability theory, random variables and distributions, sampling distributions, estimation, confidence intervals, hypothesis tests, parametric and nonparametric methods, one-way ANOVA, correlation and linear regression, as well as computing using R. This is a comprehensive introductory statistics course with focus on methodology and reasonings, applications and hands-on data analysis, and basic statistical computing.

Upon completion of the course students are expected to

- gain solid knowledge of fundamental probability, statistical concepts and methods;
- understand and interpret basic statistical analysis reported in the life, biological and health sciences literature;
- evaluate, justify or even improve basic data analysis results in their scientific field;
- conduct basic data analysis and appropriately deliver statistical findings.

Regular Homework:

- Regular homework will be assigned periodically in ICON; mostly week-long assignments. Students submit homework using file upload in ICON by its due date and time—have all your pages in a single file (Word doc, PDF, or clear and readable images/scans) of a reasonable size. Unreadable file or missing pages or submission via email won't be accepted/graded. Please double check your submission each time—points will be deducted if submission cannot be opened or read, or has wrong files or missing pages.
- The grade from the single lowest-scoring homework assignment (only one) will be dropped.
- Unless prior or prompt arrangements are made for reasons judged to be acceptable by Prof. Li, homework turned in after it is due will receive 0 (zero) credit. Homework submitted via email to me or grader won't be accepted/graded. Additionally, as answer keys will be posted soon after an assignment is graded, late homework submission will only be considered in exceptional circumstances and with prior or prompt notification.
- Students are allowed to discuss homework assignments, but every student is responsible for submitting their own work, reflective of their own effort (write up their own individual answers and do their own computing). If "blind copying" in a student's answer sheets is identified, all involved students will receive zero score and be considered as plagiarism.

Low-stakes Quizzes: There are 3 quizzes; prior to an exam, an online quiz will be given in ICON as a practice and discussed in class.

Exams:

Midterm 1	**Friday February 28, 8:30-9:20 am, location TBA**
Midterm 2	**Friday April 11, 8:30-9:20 am, location TBA**
Final Exam	**TBA by the University**

- You can bring one standard letter-size (about 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, closed-notes, and no-computer.
- Any unexcused absence from an exam will result in a score of zero with no opportunity for a makeup. A makeup exam will be considered only with documentation of reasons required by the university policy and under prior or prompt arrangement made with Prof. Li (e.g., no later than the exam day), and it should be scheduled as soon as possible.
- All exams and makeups are in-person and proctored. These exam rules apply to all exams and makeups.
- The midterm exams are given at regular class meeting times. The final examination date and time will be announced by the Registrar generally by the fifth week of classes. Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam. See the University Final Exam Policies at *https://registrar.uiowa.edu/final-exam-policies*.

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

Regular homework	17%
Low-stakes quizzes	4%
Midterm exam 1	24%
Midterm exam 2	24%
Final exam	31%

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

$[100, 90]$ A+, A; $(90, 80]$ A-, B+, B; $(80, 65]$ B-, C+, C; $(65, 45]$ C-, D+, D, D-; < 45 F.

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

assignments, exams, quizzes, solutions, recordings, textbook, reference books, etc. 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: Participation in course activities (in both lectures and labs) is very vital to your success in this course. Students are expected to attend all lectures and labs. 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, smart phones, 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. During available times, a graduate student will be present to assist you. Hours for the lab will be posted at
  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

Topics:

Schedule	Reading	Coverage
Week 1-2	Chapter 1	Introduction, R computing tutorials, basic concepts, graphical displays of data, numerical summaries of data.
Week 2-4	Chapter 2	Fundamentals of probability, methods of enumeration, set theory, theorems of probability, conditional probability, independence, Law of total probabilities and Bayes's rule.
Week 4-5	Chapter 3.I	Discrete random variable, expectation, variance, pmf, cdf, Binomial distribution, Poison distribution.
Week 5-6	Chapter 3.II	Continuous random variables, expectation, variance, pdf, cdf, Normal distributions, Normal approximation to Binomial, Normal probability plot.
Week 6-7	Chapter 4	Estimator, standard error, sampling distributions, Central Limit Theorem, confidence interval for population mean μ, confidence interval for proportion p, sample size n determination.
Week 8	Chapter 5	Fundamentals of hypothesis testing, p value.
Week 8-9	Chapter 6	One-sample test for population mean μ, Sign test and confidence interval for population median M.
Week 10-11	Chapter 7	Two independent-sample inferences: F test for equal variances, pooled t test comparing means, Welch's t test comparing means, Wilcoxon Rank Sum test comparing medians; paired data, paired t test, Sign test for paired data.
Week 12	Chapter 8	One-way ANOVA, Bonferroni t tests for pairwise comparisons.
Week 12-13	Chapter 10	Correlation, linear regression and inferences.
Week 14-15	Chapter 11	Contingency table, relative risk, odds ratio, Chi-Square goodness-of-fit test, Chi-square test for independence.

Academic Honesty and Misconduct
All students in CLAS courses are expected to abide by the CLAS Code of Academic Honesty. Undergraduate academic misconduct must be reported by instructors to CLAS according to these procedures. Graduate academic misconduct must be reported to the Graduate College according to Section F of the Graduate College Manual.

Student Complaints
Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact CLAS Undergraduate Programs for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS Associate Dean for Graduate Education and Outreach and Engagement when additional support is needed.

Drop Deadline for this Course
You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course here. When you drop a course, a "W" will appear on your transcript. The mark of "W" is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the Registrar's website. Undergraduate students can find policies on dropping CLAS courses here. Graduate students should adhere to the academic deadlines and policies set by the Graduate College.

Date and Time of the Final Exam
The final examination date and time will be announced by the Registrar generally by the fifth week of classes and it will be announced on the course ICON site once it is known. **Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.** According to Registrar's final exam policy, students **have a maximum of two weeks after the announced final exam schedule** to request a change if an exam conflict exists or if a student has more than two exams in one day (see the policy here).

Attendance and Absences
Students with UI-authorized activities must discuss their absences with the instructor as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

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. For the privacy and the protection of student records, UI faculty and staff can only correspond with UI email addresses.

Mental Health Resources and Student Support

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 Care and Assistance provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at basicneeds.uiowa.edu/resources/. Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, dos-assistance@uiowa.edu, or 319-335-1162) for support and assistance with resources.

University Policies

Accommodations for Students with Disabilities
The University is committed to providing an educational experience that is accessible to all. 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. **The student must provide an 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. Additional information can be found on the SDS website.

Free Speech and Expression
Absences for Religious Holy Days
Classroom Expectations
Non-discrimination
Sexual Harassment/Misconduct and Supportive Measures
Sharing of Class Recordings (if appropriate)