Time & Place: Monday, Wednesday, Friday 8:30 am–9:20 am, 130 Schaeffer Hall

Prerequisite: 22S:153


For more reading (increasing order of difficulty):

Class web page: [www.stat.uiowa.edu/~rlenth/s154](http://www.stat.uiowa.edu/~rlenth/s154) (Some materials on this page are password-protected. You will receive the login information in lecture.)

Instructor: Russell Lenth — 271 Schaeffer Hall — 335-0814 — russell-lenth@stat.uiowa.edu

Office Hours: Monday and Wednesday 9:30–10:30 am, Thursday 2:00–3:00 pm; and by appointment


Grades will be posted on ICON: [icon.uiowa.edu](http://icon.uiowa.edu)

Course Goals:
The successful student will leave this course with a basic understanding of many of the important foundational concepts in statistical inference. In addition, he or she will be comfortable using a wide variety of mathematical tools for solving statistical inference problems.

Topics:
This is the second course in the two-semester mathematical statistics sequence 22S:153-4. This course gives a mathematical introduction to the foundations of statistical inference, primarily from the frequentist perspective. We will cover most of Chapters 5–8 of the text, and selected material from Chapters 9–11.

Chapter 5 gives an overview of basic statistical inference concepts such as, sampling, order statistics, confidence intervals, hypothesis testing, Monte Carlo estimation, and bootstrap procedures. Chapter 6 focuses on maximum likelihood methods—estimation and testing. Chapter 7 studies the assessment of quality of estimators: unbiasedness, consistency, sufficiency, efficiency, completeness, and ancillarity. Chapter 8 explores optimality properties of statistical tests of hypotheses: for example, most powerful and uniformly most powerful tests are discussed. Chapter 11 introduces Bayesian inference. Chapter 9 describes topics related to normal model inference. Chapter 10 covers nonparametric inference.

Course work:
There will be weekly assignments due on Fridays, weekly quizzes each Wednesday (except exam days), two regular exams, and a comprehensive final exam. The dates of the exams are given in the section on grading. The best 10 of the 12 quiz grades will be counted; however, all homework assignments count.

Important: The final exam is on the last day of finals week. To get credit for the final exam, you must be here then—University policy does not allow exceptions for early finals. Make your travel plans accordingly.
Exams and quizzes will be closed-book. You will be allowed to prepare and bring one or two pages of notes to exams, as announced in class. No notes will be allowed for quizzes. Calculators will often be needed (and allowed) for exams and quizzes.

Grading
Grading elements are weighted as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Date/Time</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>Wed, February 25</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>Wed, April 8</td>
<td>20%</td>
</tr>
<tr>
<td>Final exam</td>
<td>Fri, May 15, 9:45–11:45</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>Every non-exam Wed</td>
<td>20%</td>
</tr>
<tr>
<td>Homework</td>
<td>Every Friday</td>
<td>10%</td>
</tr>
</tbody>
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The basic cutoffs between whole-letter grades are at 90, 80, 70, …, and the determination of minus, unmodified, or plus is based on the ones digit being in the sets \{0, 1, 2\}, \{3, 4, 5, 6\}, and \{7, 8, 9\}. For example, the A– range is 90.00–92.99, and the B range is 83.00–86.99.

Preparation
By referring to the schedule (posted on the course website), you will always know what is coming up. Even without any specific direction to do so, I expect you to read the text materials in advance of the lectures, and to be prepared to answer questions on what you have read.

Working together
Unless instructed otherwise, you may work together on the homework problems. However, you must write up your own solutions in your own words. Duplicated work will be treated in accordance with academic-fraud policies (see below).

Late work and absences
Barring illness or family emergencies, late homework is not accepted. In the event of an emergency or illness, please notify me as soon as possible. Failure to communicate in a timely way will hurt your chances of being accommodated. See also the CLAS policies below regarding absence forms for missed exams and quizzes.

Non-participation penalty
Every single lecture is important, and you are required to attend every single one of them. I will take attendance. For every unexcused absence from lecture, 1 percentage point will be deducted from your course average. Two grace absences are allowed before I start counting.

Computing
Some of your homework will require the use of the computer. I will give sample code as needed. The freeware package R (or its commercial relative Splus) will typically be used to perform calculations, create graphics, and carry out small-scale simulation studies.

Here are some resources that may be helpful for using R:


Extra Help
I am available to help outside of class, and will try to always be in my office at announced office hours (see the top section of the syllabus). You may also call or e-mail to make an appointment. The Statistics Department maintains a list of tutors at [www.stat.uiowa.edu/courses/tutoring.html](http://www.stat.uiowa.edu/courses/tutoring.html).

College Policies
The following are standard statements of information and policy common to most courses in the College of Liberal Arts and Sciences. While they are standard, they are also important; please read them carefully.

Administrative Home of the Course
The administrative home of this course is the College of Liberal Arts and Sciences, which governs academic matters relating to the course such as the add/drop deadlines, the second-grade-only option, issues concerning academic fraud or academic probation, and how credits are applied for various graduation requirements. Different colleges might have different policies. If you have questions about these or other CLAS policies, visit your academic advisor or 120 Schaeffer Hall and speak with the staff. The CLAS Academic
Handbook also contains important CLAS academic policies: www.clas.uiowa.edu/students/academic_handbook/index.shtml

Academic Fraud
Plagiarism and any other activities that result in a student presenting work that is not his or her own are academic fraud. Academic fraud is reported to the departmental DEO and then to the Associate Dean for Academic Programs and Services in the College of Liberal Arts and Sciences who deals with academic fraud according to these guidelines: www.clas.uiowa.edu/students/academic_handbook/ix.shtml

Making a Suggestion or a Complaint
Students have the right to make suggestions or complaints and should first visit with the instructor, then with the course supervisor if appropriate, and next with the departmental DEO. All complaints must be made within six months of the incident. www.clas.uiowa.edu/students/academic_handbook/ix.shtml#5

Accommodations for Disabilities
A student seeking academic accommodations first must register with Student Disability Services and then meet with an SDS counselor who determines eligibility for services. A student approved for accommodations should meet privately with the course instructor to arrange particular accommodations. www.uiowa.edu/~sds/

Understanding Sexual Harassment
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. Visit www.sexualharassment.uiowa.edu/ for definitions, assistance, and the full policy.

Reacting Safely to Severe Weather
The University of Iowa Operations Manual section 16.14 outlines appropriate responses to a tornado (i) or to a similar crisis. If a tornado or other severe weather is indicated by the UI outdoor warning system, members of the class should seek shelter in rooms and corridors in the innermost part of a building at the lowest level, staying clear of windows, corridors with windows, or large free-standing expanses such as auditoriums and cafeterias. The class will resume, if possible, after the UI outdoor warning system announces that the severe weather threat has ended.

Student Classroom Behavior
The ability to learn is lessened when students engage in inappropriate classroom behavior, distracting others; such behaviors are a violation of the Code of Student Life. When disruptive activity occurs, a University instructor has the authority to determine classroom seating patterns and to request that a student exit the classroom, laboratory, or other area used for instruction immediately for the remainder of the period. One-day suspensions are reported to appropriate departmental, collegiate, and Student Services personnel (Office of the Vice President for Student Services and Dean of Students).

Missed Exam Policy
University policy requires that students be permitted to make up examinations missed because of illness, mandatory religious obligations, certain University activities, or unavoidable circumstances. Excused absence forms are required and are available on the Registrar web site. www.registrar.uiowa.edu/forms/absence.pdf

Final Examinations
An undergraduate student who has two final examinations scheduled for the same period or more than three examinations scheduled for the same day may file a request for a change of schedule before the published deadline at the Registrar’s Service Center, 17 Calvin Hall, 8-4 M-F, (384-4300).