

Time & Place	Monday, Wednesday, Friday 8:30 am–9:20 am, 130 Schaeffer Hall
Prerequisite	22S:153
Required Text	Hogg, McKean, and Craig (2005), <i>Introduction to Mathematical Statistics</i> (6th ed.), Prentice-Hall, ISBN 0-13-008507-3.
For more reading (increasing order of difficulty)	<ul style="list-style-type: none"> <li>• Hogg, R.V. and Tanis, E.A. (1997), <i>Probability and Statistical Inference</i> (5th ed.), Prentice Hall.</li> <li>• Wackerly, D.D., Mendenhall, W. and Scheaffer, R.L. (1996), <i>Mathematical Statistics with Applications</i> (5th ed.), Duxbury Press.</li> <li>• DeGroot, M.H. and Schervish, M.J. (2002), <i>Probability and Statistics</i> (3rd ed.), Addison-Wesley.</li> <li>• Casella, G. and Berger, R.L. (1990), <i>Statistical Inference</i>, Duxbury Press.</li> </ul>
Class web page	<a href="http://www.stat.uiowa.edu/~rlenth/s154">www.stat.uiowa.edu/~rlenth/s154</a> (Some materials on this page are password-protected. You will receive the login information in lecture.) Grades will be posted on ICON: <a href="http://icon.uiowa.edu">icon.uiowa.edu</a>
Instructor	Russell Lenth — 271 Schaeffer Hall — 335-0814 — <a href="mailto:russell-lenth@stat.uiowa.edu">russell-lenth@stat.uiowa.edu</a>
Office Hours	Monday and Wednesday 9:30–10:30 am, Thursday 2:00–3:00 pm; and by appointment
Statistics office	DEO: Professor Luke Tierney — 241 Schaeffer Hall — 335-0712

### 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 4–8 of the text, and very limited material from Chapters 9–11, as time permits.

Chapter 4 discusses the limiting behavior of statistics (i.e., what happens as the sample size increases). 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. The topics from remaining chapters will be chosen to broaden your knowledge of statistics as much as possible in the time available.

### 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:

Exam 1	Wed, February 25	20%
Exam 2	Wed, April 8	20%
Final exam	Fri, May 15, 9:45–11:45	30%
Quizzes	Every non-exam Wed	20%
Homework	Every Friday	10%

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 a 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. We will not do much with R, however; to learn more, take an applied statistics course.

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

- SimpleR by John Verzani: [www.math.csi.cuny.edu/Statistics/R/simpleR/](http://www.math.csi.cuny.edu/Statistics/R/simpleR/)
- An Introduction to R, by Elizabeth Slate and Elizabeth Hill: <http://people.musc.edu/~slateeh/Rintro/Rintro.html>

## 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](http://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](http://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](http://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/](http://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/](http://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](http://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).