

Time & Place	Monday, Wednesday, Friday 10:30 am–11:20 am, 150 Schaeffer Hall
Prerequisite	A good multiple-regression course
Required Text	Box, GEP, Hunter, JS, Hunter, WG (2005), <i>Statistics for Experimenters</i> (2nd edition), Wiley-Interscience, ISBN 978-0-471-71813-0
Class web page	<a href="http://www.stat.uiowa.edu/~rlenth/s172">www.stat.uiowa.edu/~rlenth/s172</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	Mon & Wed 11:30–12:30 am, Thu 2:00–3:00 pm; and by appointment
Statistics office	DEO: Professor Dale Zimmerman — 241 Schaeffer Hall — 335-0712

### Course Goals

To cover some important and interesting topics in experimental design, with emphasis on the types of experiments that are used in industry. In contrast to typical agricultural or social-science experiments, these typically involve a fairly large number of factors and few (if any) replications. Such experiments are also used in some non-industrial settings, e.g., pre-clinical experiments for drug development.

solution to any problem to the class on the due date. You will self-grade your homework paper, and turn it in at the end. I will check for reasonable consistency in grading and record the grades.

### Grading

Grades are determined from four equally-weighted components:

### Topics

- Ch 1–3** Review of statistical methods and experimental-design basics;
- Ch 4** Block designs, including Latin squares and incomplete blocks;
- Ch 5–6** Two-level factorials, fractional factorials, fractional blocking, aliasing;
- Ch 7, supplement** Follow-up experiments, other designs (orthogonal arrays, D-optimal, computer-generated);
- Ch 9** industrial split-plot designs;
- Ch 10–12 (parts)** Response-surface methods
- Ch 13** Product/process robustness experiments.

We may discuss and modify this plan based on interests of the class.

### Course work

Homework will be assigned weekly, and due on Friday (usually). You should be prepared to present your

Exam 1	Mon, October 4	25%
Exam 2	Mon, November 8	25%
Final exam	Wed, Dec 15, 9:45	25%
Homework	Every Friday	25%

Since we appear to have a small number of students, all or some of these exams may be given orally.

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.

### Attendance policy

The goal of taking a course is learning. I can promise that every single lecture will contain some material that is not in the textbook. Consequently, missing a course activity reduces your learning; and so I require attendance at every lecture.

**There is a penalty for absences.** You are allowed 2 unexcused absences without penalty. After that, one (1)

percent point will be deducted from your course average for each unexcused absence from lecture. Showing up late counts as 1/3 of an absence.

## 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.

## Solving statistics problems

In preparing homework, please understand that most

problems are not about getting the right numerical answer (though that is an important step); they are about reaching an appropriate statistical inference. Doing so requires inductive reasoning, diagnostic methods, and good communication. Mere presentation of computer output or hand calculations will seldom constitute an adequate answer to a question.

## Computing

Computing is supplanting mathematics as the primary infrastructure for statistical methods. We will use statistical packages—primarily R, Minitab and SAS—to do analyses. (We can discuss what programs you are most familiar with; there is flexibility here.)

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## 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).