

# 22S:158 Experimental Design and Analysis

## 22S:165 Applied Statistics II

Spring semester, 2008

Time & Place	Monday, Wednesday, Friday 9:30 am–10:20 am, 61 Schaeffer Hall
Prerequisites	22S:158: 22S:30 and 22S:152    22S:164: 22S:164 or equivalent
Text materials	Lenth, R. V. (1994), <i>Design, Data, and Deduction: An Introduction to Experimental Design</i> , self-published notes available for download on the course website. Oehlert, G. W. (2000), <i>A First Course in Design and Analysis of Experiments</i> , New York: W. H. Freeman and Company.
Class Web page	<a href="http://www.stat.uiowa.edu/~rlenth/Design/">http://www.stat.uiowa.edu/~rlenth/Design/</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/">http://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 10:30–11:30 am, Thursday 2:00–3:00 pm; and by appointment
Statistics office	DEO: Professor Luke Tierney — 241 Schaeffer Hall — 335-0712

### Course Goals

The main lesson to be learned in this is course is

It matters a lot how you collect data; and that in turn dictates how data should be analyzed.

*Randomization* is important—you already know that; but certain kinds of *restricted randomization (blocking)* can often make a huge improvement. Designing experiments involves identifying the biggest sources of variation, and (within the scope of what is practical) *controlling for* them in ways that minimize the error in estimating the parameters of greatest interest.

By the end of this course, you should be well acquainted with all of the basic principles of experimental design, and be able to analyze measurement data from designed experiments. You will understand how to model experimental data and to extend this knowledge to experiments having an unfamiliar structure. You will also be able to understand how the structure of models can give you information about the relative advantages and disadvantages of different designs.

### Topics

The course website provides a schedule of topics to be covered. The earlier part of the course emphasizes intuitive ideas in experimental design, based on the Lenth notes (*DDD* for short), Chapters 1, 2, 3.1, 4, and 5. The later part of the course goes into more detail in modeling and analysis, and covers much of the Oehlert

book, but omitting parts of Chapter 10 and Chapters 14, 15, and 18 through 20.

### Computer software

We will use SAS as the primary tool for data analysis. Web-based Java applets provided by the instructor will be used for simulations and sample-size determination.

### Course work

There will be weekly assignments, three regular exams (each on about 1/3 of the course topics), and a comprehensive final exam. The dates of these exams are given in the section on grading. *Deviations from the scheduled final time will only be made in accordance with University policies. If you fly home early, you will get a zero on the Final.*

Some of the homework will be mini-project-like in that you will have to design experiments and collect the data using simulation software. There will be one major exercise of this type in the last few weeks of the semester that will be graded separately as a project.

Some homework problems and exam questions may be designated only for students in 22S:165 or only for students in 22S:158.

Working with another student on homework is OK; however, you must (1) write your homework papers independently, and (2) write the name(s) of your study partner(s) on your homework papers.

## Participation

By referring to the schedule, 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.

## Grading

Grading elements are weighted as follows:

Exam 1	Fri, Feb 22	20%
Exam 2	Wed, Apr 2	20%
Exam 3	Wed, Apr 30	20%
Final exam	Tue, May 13, 2:15–4:15	20%
Project	.....	10%
Homework	.....	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.

## Late work and absences

Barring illness or family emergencies, late work is not accepted. In the event of such an emergency or illness, you must notify me as soon as possible—within 24 hours. If you miss class, try to obtain notes from other students. Most handouts will be available from the website; but lecture notes will not. If there is a pattern of excessive absences from the lecture, I will warn you; if the pattern continues, I will drop you from the course.

## 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).

## 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. [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 a 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.

## 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 CLAS requirements. Please keep in mind that 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 is another useful source of information on CLAS academic policy:

[www.clas.uiowa.edu/students/academic\\_handbook/index.shtml](http://www.clas.uiowa.edu/students/academic_handbook/index.shtml)

## 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 and Dress

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). I also request that students dress modestly.

## 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 Registrars Service Center, 17 Calvin Hall, 8-4 M-F, (384-4300).