

Computing in Statistics, 22S:166
Fall 2008

1 General Information

Instructor:	Kate Cowles, 374 SH, 335-0727 kcowles@stat.uiowa.edu
Office hours:	T 1:30 - 2:30 p.m. W 12:30 - 1:30 p.m. Th 1:30 - 2:30 p.m. Please feel free to make appointments to see me outside of office hours, and to send me questions by e-mail.
Department: DEOC:	Statistics and Actuarial Science, 241 SH Luke Tierney, 241 SH, 335-0712 luke-tierney@uiowa.edu
Lectures:	M, W, F 74 SH 2:30 - 3:20
Lab:	some Fridays (instead of lecture) 41 SH or 346 SH
Web page:	http://www.stat.uiowa.edu/~kcowles/s166.2008 Handouts, homework assignments, datasets, etc. will be posted on the web page for you to download. Homework submission and posting of solutions will be on ICON course web page.
Required readings:	See "Web Resources" section of course web page
Mathematical Sciences Library, 125 MLH:	Gliven and Horning, <i>Computational Statistics</i>

2 Course goals and objectives

Through hands-on experience with real problems, students will learn computing skills essential in applied statistics and in research in methodological and theoretical statistics. Topics include the Linux operating system; R and SAS (statistical computing environments); L^AT_EX (mathematical document preparation language); reproducible research; database management; simulation methods (Monte Carlo studies, bootstrap, MCMC); statistical computing algorithms (Newton's method); interfacing to cyberinfrastructure resources.

3 Evaluation of students

3.1 Homework

In general, homework will be assigned each Fri. and will be due in class the following Fri. Exceptions to this schedule will be announced in class.

Show your work when solving written homework problems. Code and output for computer problems should be submitted electronically through the ICON submission tools for this course (icon.uiowa.edu).

You are encouraged to study with others. However, if you do work with others on homework assignments, please: a) write up your own assignment and make sure you completely understand all solutions that you submit, and b) write the names of the others in your study group on your assignment.

Late homework is accepted only as required by university policy, i.e. due to "illness, mandatory religious obligations, or other unavoidable circumstances or University activities."

3.2 Exams

There will be two 2-hour hands-on computing midterm exams and one comprehensive final. The midterms will be scheduled in the computer lab outside of the regular class period and will replace the lab session for that week. The final will be given during the scheduled final-exam period. The computing exams are open book and open notes. Students may bring one 8-1/2 x 11 in. sheet of paper with notes to the final exam.

Midterm 1	week of 9/29, 41 SH (replaces lab on 10/3)
Midterm 2	week of 11/3, 41 SH (replaces lab on 10/31)
Final exam	9:45 A.M., Mon, Dec 15 2008

Missed exams may be made up only with documentation of reasons required by university policy (see "Late Homework" above).

3.3 Projects

Students will work in groups of three to carry out projects involving application of the statistical computing methods covered in the course to problems of their own choosing. I will be happy to work with you at each stage of your project. Examples of possible types of projects are:

- Design and carry out a simulation study to compare the properties of two or more statistical procedures
- Learn to use two or more R packages that we have not studied as a class. Apply them to perform useful analyses of a real dataset.
- Choose a research question and find data to address it. Use SAS to "clean" and prepare the data and to carry out an analysis.

Projects will be carried out in three phases. Please meet with me at least once while you are working on each phase.

- **Project proposal (due 11/03)** This is a detailed description of what you plan to do, including question(s) to be addressed, software to be used, methods to be applied.
- **Project interim report (due 11/19)** This informal report will indicate that your project is "on track." All computing should be completed at this point. The interim report will include results obtained thus far and a brief summary (hand-written is O.K.) of what they mean and what remains to be done. In addition, each member of the project team will list which tasks they have performed for the group.
- **Project presentation (must be posted or submitted by 12/08)**
The final form of the project must be prepared in L^AT_EX. This can be either
 - a paper to be posted on the course web page (send PDF file to me for posting)
 - slides to accompany an oral presentation to the class (use computer and projector in the classroom)

Presentations will be given in class during the week of 12/08.

3.4 Grading

The course components will be weighted as follows:

Homework	10%
Midterms	35% (17.5% each)
Project	20%
Final	35%

Grading will be on a curve, with +/− grades used. A grade of A+ represents exceptional work and rarely is awarded.

4 Extra Help

The Statistics Tutorial Lab, located in 202 CC, gives free tutorial assistance to students in 225:2, 8, 26, and 39. In addition, several graduate students have volunteered to independently tutor students in various 225: courses at mutually-arranged times and fees. Please check the web site www.stat.uiowa.edu/courses/tutoring.html for tutoring details.

5 College of Liberal Arts and Sciences: Policies and Procedures

5.1 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

5.2 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/1x.shtml

5.3 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_

5.4 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/

5.5 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.

5.6 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.

5.7 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).

5.8 University Examination Policies

5.8.1 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

5.8.2 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).

6 Syllabus

This approximate schedule will be updated as needed during the semester.

08/25 - 08/29	Intro to Linux Lab in 346 SH 8/29
09/03 - 09/06	Intro to R/Python (no class on 9/1; holiday) Lab in 41 SH 09/06
09/08 - 09/12	Intro to R Lab in 41 SH 09/12
09/15-09/19	R packages Sweave and reproducible research
09/22-09/26	Newton's Method The bootstrap
09/29 - 10/03	The jackknife Midterm 1 Wed 10/01 No class 10/03
10/06 - 10/10	Simulation studies
10/13 - 10/17	Database concepts and Microsoft Access Lab in 41 SH 10/17
10/20 - 10/24	Reading data into SAS
10/27 - 10/31	File handling in SAS; arrays no class on 10/31
11/03 - 11/07	Formats; reports; proc tabulate, etc. project proposals due 11/03 Midterm 2 Wed. 11/05 (replaces lab on 10/31)
11/10 - 11/14	Data checking and validation
11/17- 11/21	SAS macro language project interim reports due 11/19
11/24 - 11/28	Thanksgiving break
12/01 - 12/06	Parallel and grid computing; review
12/08 - 12/12	Project presentations Projects due 12/08
Final exam	Mon. 12/15, 9:45 a.m.