

The University of Iowa
College of Liberal Arts and Sciences
Department of Statistics and Actuarial Science

Biostatistics – 22S:101:BBB

Fall 2009 (created 08/15/09)

Time & Location: MWF 1:30-2:20, 100 PH

Lecture notes and other materials are on ICON

Policies relating to this course are governed by the College of Liberal Arts and Sciences.

Instructor: George G. Woodworth

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Office Hours: MWF 3:00-5:00, or by appointment.

DEO: Luke Tierney, 241 Schaeffer Hall

Description, Objectives and Goals of the Course:

This is an introductory course on statistical reasoning in biology, health sciences, and related fields. The course is entirely Bayesian. Topics covered include basic concepts of probability, statistical inference, and decision theory. Applications covered in this course include diagnostic testing; inference on rates, relative risks, and odds ratios; inference on means; basic experimental design; linear, logistic, and proportional-hazards regression; survival analysis; statistical adjustment of means, odds ratios, and hazard ratios; multiparameter inference.

The course provides an introduction to the statistical computer packages WinBUGS and SAS. Upon completion of the course students are expected to be able to execute basic statistical analyses using SAS and WinBUGS and to be able to interpret statistical reports in the biomedical literature that employ methods covered in this course.

Text: *Biostatistics: A Bayesian Introduction*, by George G Woodworth

Grading System:

The course grade not "curved" to achieve a specified grade distribution. However, the College of Liberal and the Educational Policy Committee recommend a very judicious use of the A+ grade, asking that it be used only in extraordinary situations. In this course, an A+ grade requires at least a 99% overall average and the submission of a self-designed data analysis project report (consult the instructor before undertaking this project); other grades are assigned this way:

92-100 A / 90-91 A- / 88-89 B+ / 82-87 B / 80-81 B- / 78-79 C+ / 72-77 C / 70-71 C- / 50-69 D / 0-49 F

Assignments Quizzes (if instituted) : 44% of course grade

There will be daily homework assignments which are generally due one week after they are assigned, unless noted otherwise. Some assignments require the use of a computer; instruction will be provided on all software used in the course.

Exams:

Midterms: **18% of course grade each – total 36%**

Final Exam: **20% of course grade**

Course Policies:

Assignments are submitted in the ICON drop box on or before the due date. Late submission will be excused for any of the reasons listed under "Missed Exam Policy" below. Excused late submissions **will not be graded** and will not be counted in the numerator or denominator of the

homework average. Unexcused late submissions will receive a score of zero and ***will be included*** in the homework average.

Extra Help: Several graduate students have volunteered to independently tutor students in various 22S: courses at mutually-arranged times and fees. Please check the web site www.stat.uiowa.edu/courses/tutoring.html for tutoring details.

College of Liberal Arts and Sciences: Policies and Procedures

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 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).

Unacceptable behaviors include but are not limited to, web surfing unrelated to the class, cell phone use, reading material unrelated to the class, conversations unrelated to the class, conspicuous inattention, and leaving early, except for sudden illness, without notifying the instructor in advance.

Attendance and Participation Policy

If a pattern of flagrant and repeated non-attendance arises, the Instructor reserves the right to administer unannounced quizzes. If quizzes are introduced, missing three quizzes, without valid excuses, will result in expulsion 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, including family events, job interviews, and trips to professional meetings. If in doubt, ask the instructor in advance. Excused absence forms are (not) required (by this instructor) 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).

Course-related materials.

Powerpoint slides and other supplementary materials are posted on the ICON website under "contents." Links to spreadsheet applets and data files for the computer assignments are posted there as well.

Old exams, supplemental exercises, data sets, errata sheets, instructions for the term papers, etc. are on the textbook website <http://www.stat.uiowa.edu/~gwoodwor/BBIText/Index.html>

Class Schedule (Subject to Revision)

Lect	Day	Date	Topic	Read	HWK	DUE	
1	M1	08/24/09	Stat Sci; Probability	1-2.4	1.1;2.1,6	F1	
2	W1	08/26/09	Expectation, Fair Price	2.5 – 2.8	2.2,3,5	M2	
3	F1	08/28/09	Epistemic Probability	3.1-3.8.4	3.1,2	W2	
4	M2	08/31/09	Product Rule	3.8.5-3.9	3.4; AE3.1	F2	
5	W2	09/02/09	Descriptive Stats	4.1-4.4.2	4.1,2,3	W3	
6	F2	09/04/09	SAS	C.1-3	4.4,5	F3	
	M3	09/07/09	University Holiday				
7	W3	09/09/09	Inference	5.1-5.2.2	5.1,2	M4	
8	F3	09/11/09	DNA Fingerprinting	5.2.3	5.3	W4	
9	M4	09/14/09	Inference on a Rate	5.3-5.5	5.4,5	F4	
10	W4	09/16/09	Continuous distributions	6.1-6.4	6.1,3	M5	
11	F4	09/18/09	Beta and approx normal	6.5-6.6	6.2, 6.6, 6.8	W5	
12	M5	09/21/09	MCMC	Lect 13	L13.1,2,3	M6	
13	W5	09/23/09	WinBUGS	B.1-B.3	6.7c, 6.8c&d	W6	
	F5	09/25/09	Midterm I (covers thru F4)				
14	M6	09/28/09	Δ of two Rates	7.1-7.4	7.1; AE7.1	F6	
15	W6	09/30/09	Relative Risk	7.6.1-3	7.4, 7.5(b)	M7	
16	F6	10/02/09	Frequentism	7.5	7.3,5(a-c); AE7.10	W7	
17	M7	10/05/09	Odds Ratio	7.6.4-5	7.6,7	F7	
18	W7	10/07/09	Δ , OR, RR via WinBUGS	7.7.1; B4	7.11 (Data of 7.9)	M8	
19	F7	10/09/09	Δ , OR, RR via Proc Freq	7.7.2	7.10 (Data of 7.9)	W8	
20	M8	10/12/09	t-distribution for μ	8.1.2	8.1(a&b)	F8	
21	W8	10/14/09	Comparing Means	8.3.1-3	8.2,4	M9	
22	F8	10/16/09	Comparing Medians	8.4	8.8	W9	
23	M9	10/19/09	Design of Experiments	8.5	8.7; AE8.8	F9	
24	W9	10/21/09	SAS: Proc Mixed	8.6; C3	TBA	M10	
25	F9	10/23/09	Linear Models	9.1-9.3.2	9.1; 9.2	W10	
26	M10	10/26/09	PPD and LSM's	9.3.3-9.4	9.3; AE9.1	M11	
27	W10	10/28/09	Design Variables	9.5,6	9.4,5,6; AE 9.2,6	W11	
	F10	10/30/09	Midterm II (M5 thru F9)				
28	M11	11/02/09	X-over Designs Via SAS	9.7-9.8	AE9.7,8	F11	
29	W11	11/04/09	Logistic Regression	10.1-3	10.1,2,5,7,8	M12	
30	F11	11/06/09	Proc Logistic	10.4-5	10.3,4,6	W12	
31	M12	11/09/09	Kaplan-Meier	12.1-12.3.1	12.1	F12	
32	W12	11/11/09	Comparing Survival	12.3.2-.6	12.3	M13	
33	F12	11/13/09	Meta Analysis	11.1-.6	AE11.1,2	W13	
34	M13	11/16/09	Borrowing Strength	11.6-.8	11.3,4	F13	
35	W13	11/18/09	Backward Induction	13.1-13.3	13.1,2,3	M14	
36	F13	11/20/09	Sample Size: Bayesian	13.4; L37	37.1,2; 13.4,5	W14	
Thanksgiving Break							
37	M14	11/30/09	Sample Size: Frequentist	Lect 37	37.1,2	F14	
38	W14	12/02/09	Dirichlet Distributions	Lect 38	38.1,2	M15	
39	F14	12/04/09	HDR's, FBST, HWE	Lect 39	39.1,2	W15	
40	M15	12/07/09	Chi Square "tests"	Lect 40	40.1,2,3	F15	
41	W15	12/09/09	F "tests"	Lect 41	41.1,2	@final	
42	F15	12/11/09	Final Review				
FINAL EXAM 9:45-11:45 AM Tuesday, Dec 15, 2009 (location to be announced)							