

**22S:2 Statistics and Society, Summer 2007**Home > **SYLLABUS**

<b>Course Web Pages:</b>	Start at <a href="http://www.stat.uiowa.edu/~jblang/s2">http://www.stat.uiowa.edu/~jblang/s2</a> [ username: <i>stat</i> password: <i>s207</i> ]
<b>Lecture/Discussion/Lab:</b>	1:00-4:10 MTWRF, 66 SH; Lab 41 SH
<b>Instructor:</b>	Joseph B. Lang, 207 SH, 335-3129, <a href="mailto:joseph-lang@uiowa.edu">joseph-lang@uiowa.edu</a>
<b>Office Hours:</b>	11:00-12:00 MTWRF, or by appointment
<b>Pre-Requisites:</b>	22M:001 or equivalent
<b>Department, College:</b>	Statistics and Actuarial Science, Liberal Arts and Sciences
<b>DEO:</b>	Luke Tierney, 241 SH, 335-0712, <a href="mailto:luke-tierney@uiowa.edu">luke-tierney@uiowa.edu</a>
<b>Main Office:</b>	241 Schaeffer Hall

<u>Required Text</u>	<u>Description</u>	<u>Objectives</u>	<u>Organization</u>
<u>Pace</u>	<u>Guidelines</u>	<u>Grading</u>	<u>Miscellaneous</u>

**Required Text:**

Bennett, J.O., Briggs, W.L., and Triola, M.F. 2003. *Statistical Reasoning for Everyday Life*, 2<sup>nd</sup> edition, Boston: Addison Wesley, Pearson Education, Inc. ISBN 0-201-77128-4.

**Course Description:**

This is a course on statistical literacy, which is the ability to understand and critically evaluate statistical results that are encountered on a daily basis. This course will introduce the student to many basic statistical concepts including, variables, variability and predictability, distributions, probability, margin of error, and statistical significance. The student will learn how to create and interpret numerical and graphical descriptions of samples and populations. The rudiments of statistical estimation and hypothesis testing will be covered as well. We will discuss the importance of study design, emphasizing the vitally important difference between observational studies and designed experiments. Statistical fallacies and common abuses will be discussed at length; examples include: association does *not* imply causation, conditional vs. marginal relationships, confounding variables, poor sampling methods, data snooping and the law of truly large numbers, statistics as propaganda, graphical prevarication, statistical vs. practical significance, "file-drawer" bias, stereotyping, sophomore slump fallacy, prosecutor's fallacy, gambler's fallacy, etc. Instead of memorizing formulae and lists of bulleted items, we will spend our time learning about the important concepts and the logic of quantitative argument.

**Course Objectives:**

The successful student will leave this course with the ability to understand and critically evaluate statistical results that are encountered on a daily basis. The student will learn to appreciate the contribution that statistical thinking makes in public and personal decisions. The student will learn to recognize statistical fallacies and abuses. More specific skills

include some facility with the statistical software Minitab, the ability to create simple graphics and compute appropriate numerical summaries, and the ability to understand computer-based simulation.

### Course Organization:

**Lectures/Discussion/Small-Group Work.** The three hour period (1:00-4:10pm) will be filled with lecture, discussion, and small-group work. Daily worksheet exercises, along with discussion and feedback, will facilitate hands-on learning. The material covered in this course comes primarily from Chapters 1-9 of the BBT textbook.

**Homework Exercises.** Homework will be assigned each day and will be due the following day.

**Computing.** At times, we will meet in the computer lab in 41 SH. In the lab, you will learn to use the statistical software package Minitab to create graphs, compute numerical summaries, and carry out simulation studies. Minitab, release 14 is available at all the instructional technology centers (ITCs) across campus.

**Exams.** There will be three in-class exams (Fri, May 18; Fri, May 25; and Fri, June 1).

### Course Pace (tentative):

Day	Concepts	Sections in BBT
M	Introductions, Stat Concepts, Sampling, Fundamental Theorem of Statistics	1.1-1.2
T	Observational Studies vs. Designed Experiments, Statistical Fallacies and Abuses	1.3-1.4
W	Statistical Fallacies and Abuses	1.4
R	Data Types, Measurement Error, Using Percentages, Index Numbers	2.1-2.4
F	Frequency Tables, Picturing Distributions, <b>EXAM #1</b>	3.1-3.2 (read 3.3-3.4)
M	Numerical Descriptions of Quantitative Distributions	4.1-4.3
T	Normal Distribution, Computing with Normal Curves, Empirical Rule	5.1-5.2 (skip 5.3 for now)
W	Statistical Significance, Probability Distributions, Expectations	6.1, handout on prob distns
R	Correlation (especially interpretation), Straight-Line Regression	7.1-7.3
F	Straight-Line Regression and Prediction, Search for Causality, <b>EXAM #2</b>	7.3-7.4
M	No Class--University Holiday	No Class
T	Sampling Distributions, Central Limit Theorem	8.1, 5.3
W	Estimating Population/Probability Means, Estimating Population Proportions/Probabilities	8.2-8.3
R	Logic of Hypothesis Testing, Hypothesis Tests for a Population/Probability Mean	9.1-9.4
F	Hypothesis Tests for a Population Proportion/Probability, <b>FINAL EXAM</b>	9.5

**Course-Specific Guidelines and Policies:**

**Reading Ahead.** It is vitally important that you read ahead. If the material in a lecture is completely new to you, you will find it very difficult to get much out of lecture.

**Effort Expectations.** My effort expectations align with the guideline adopted by the college of LAS. For a 3 s.h. course delivered in three-week format, you should expect to spend about 4 to 6 hours per day preparing for class sessions and doing homework. Of course, the '4 to 6 hours per day' is an average taken over the three-week session. It is also an average taken over a diverse collection of students and courses. Thus, effort amounts will vary. It is fair to say, however, that the more effort you put in, the more you will get out of the course.

**Participation, Attendance, and Point-Earning Opportunities.** Students are expected to attend, and participate in, class. You will be asked many questions, and you will be strongly encouraged to ask lots of questions. If you miss a class, you run the risk of missing a point-earning opportunity, which cannot be made-up. Point-earning opportunities will usually be in the form of an in-class worksheet exercise.

**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*. If you are personally asked to please write up your own solutions and subsequently turn in material that is obviously in the same words as a fellow student, the work will be considered to be plagiarized. Plagiarism will be dealt with according to the policies of the College of Liberal Arts and Sciences and the University (see additional information at the end of this syllabus).

**Exams.** The one- to two-hour long exams will all be closed-book. The exams will include multiple-choice, true-false, fill-in-the-blank, and short-answer items. You will be allowed to use one (two-sided) crib sheet for the exams. Bring along a calculator.

**Late Homework.** Unless otherwise instructed, homework is due at the start of class, at 1:00 pm. Late homework has a discrete half-life of 24 hours; that is, you get 50% credit if it is handed in late, but within 24 hours of the due time; you get 25% credit for the next 24 hours, etc. Homework not handed in directly to me must be handed in to a department secretary (located in 241 SH)--it must include a hand-in time and date, and must be signed by the department secretary. (It follows that you cannot hand in homework after the main office is closed.)

**Grading Questions.** Questions about grading must be asked within two days of the graded work's return.

**Grading and Components for Evaluation**

Your final score  $S$  will be computed as  $S = 0.20E_1 + 0.25E_2 + 0.25F + 0.25H + 0.05P$ , where  $E_i$  = percent correct on exam  $i$ ,  $F$  = percent correct on the final,  $H$  = percent correct on homework and  $P$  = participation/attendance score on a 0-100 scale [Because of point-earning opportunities, your  $P$  score can end up above 100.]

Letter grades, including +'s and -'s, will be awarded according to a 90-80-70-60 schedule; e.g. if  $S \geq 90$  then a grade of A- or better will be awarded. These are guaranteed cutoffs, so

it is possible, but unlikely. that everyone receives an 'A.' I do, however, reserve the right to lower (but not raise) the cutoffs. Note that with this grading scheme you are not "graded on a curve," so you are not competing with fellow students. Therefore, you are not penalized for working together to better understand concepts.

## Miscellaneous

### Help outside of class:

- I have regular office hours. Sometimes it is effective to ask specific questions via email.
- Course web pages; start at <http://www.stat.uiowa.edu/~jblang/s2>.
- A list of tutors is maintained by the Department of Statistics and Actuarial Science at <http://www.stat.uiowa.edu/courses/tutors.html> .

### Help with Minitab software:

- Minitab Tutorial: <http://plato.acadiau.ca/courses/math/cabilio/minitab/minitab1.html>
- Minitab Manual: <http://www.minitab.com/support/docs/re114/MeetMinitab14.pdf>

**Information for students with disabilities:** I would like to hear from anyone who has a disability which may require some modification of seating, testing, or other class requirements so that appropriate arrangements can be made. Please see me about this in my office as soon as possible. (First visit the University of Iowa Student Disability Services webpage for information about the procedures for requesting accommodations )

**Class Policy:** Class policies are governed by the College of Liberal Arts and Sciences (CLAS), the administrative home of this course. Policy details can be found in the CLAS student handbook.

**Complaint Procedure:** I am reminded to tell you that there are procedures available to you if you have complaints about the oral communication competence of the instructor in this course, the teaching competence of his TA's, or other aspects of the obligations of faculty and TA's that are covered by University policy. Ask me or one of the administrative personnel in the Department of Statistics and Actuarial Science for more information. You can also find relevant information in the CLAS student handbook, especially Section IX. Student Rights and Responsibilities.

**Academic Misconduct:** The College of LAS considers academic fraud, dishonesty, and cheating serious academic misconduct. I adhere to the College's policy, a summary of which follows: A student who plagiarizes or cheats on any assignment or exam faces penalties that may include an 'F' on the work or an 'F' in the course. If I suspect academic fraud there are very specific procedures I am obligated to follow. These are outlined in Section IX. Student Rights and Responsibilities of the CLAS Student Academic Handbook. Please see the additional university policies that also describe (a) complaint procedures and (b) student academic (mis)conduct.

*I hope you all have an enjoyable and successful summer session.*