

Data Analysis and Statistical Inference

STA 101 Sec 3

SYLLABUS AND COURSE POLICIES

Fall, 2004

Instructor:	Bertrand Clarke Old Chem 112A bertrand@stat.duke.edu (919) 684 5956 Office Hours: TBA (with some exceptions due to travel), or by appointment.
Teaching Assistants:	TBA
TA Location:	Old Chem 211 AB: Statistical Education and Consulting Center. You can attend any of the office hours held in the SECC; all TAs on staff in the SECC are there to work with you.
Course Web Page:	http://www.stat.duke.edu/courses/Fall04/sta101.3/
Lectures:	T/Th 1:15 - 2:30, LSRC/Love Aud
Computer Labs:	All labs are on Mondays in 01 Old Chemistry Building. Section 11L starts at 9:30; 12L starts at 10:30; 13L is at 11:40; All sections last 50 minutes.
Text:	Freedman, Pisani, and Purves, (1998). <i>Statistics</i> , Third Edition. The lab work will use JMP-IN, which is available from the bookstore.

OVERVIEW

Does the Atkins diet help people lose weight? Does vitamin C prevent colds? Should managers walk Barry Bonds or pitch him? Can you predict someone's university grades from their SAT scores? Is it possible to win money in a casino? Statistics can answer all of these questions. Broadly speaking, statistics is a set of methods that help us collect, organize and process data. We use these tools to uncover relationships between variables, to make predictions, and to discover causal mechanisms. The aim of this course is to help you become statistically literate. You will learn the main concepts in the field and be equipped to recognize whether quantitative arguments you encounter are accurate or misleading.

The course will use few equations, but the ideas are deep—it will not be easy. We shall emphasize graphical analysis of data and simple but powerful concepts that do not require difficult mathematical manipulations. The main concepts we shall talk about in class are:

- Experimental Design and Exploratory Data Analysis
- Correlation and Regression
- Laws of Probability
- Sample Surveys and Sampling Distributions
- Estimation and Significance Tests
- Bayesian Perspective in Statistical Inference

GRADED WORK

Graded work for the course will consist of quizzes, lab work, two midterms, and a final exam. Your final grade will be determined as follows:

Final exam	30 %
Midterm I	20 %
Midterm II	20 %
Quizzes	20 %
Lab work	10 %

Excused absence from an exam requires documentation of a medical or family emergency. Missed quizzes or lab reports will not be excused except in exceptional circumstances (e.g., an athlete who must miss multiple classes may be excused by prior arrangement for specific days, but undocumented minor illness is not excusable). Prior approval from the instructor is needed for all but emergency situations, and even then email notification is needed at the first reasonable time.

If a student has an excused absence from a midterm exam, then the weight of that material is transferred to the final exam. If a student has an excused absence from a quiz or lab report, then the missing grade will be imputed by the average of all other quiz or lab report grades. If a student has an excused absence from the final exam, then special arrangements will be made on a case-by-case basis.

Each exam, quiz, or lab will receive a letter grade. An A+ corresponds to a score of 4.0, an A corresponds to 3.7, an A- is a 3.3, a B+ is a 3.0, and so forth. The final grade in the course is determined by the weighted average (as per the table above) of these scores. Breakpoints for grades occur at the halfway points. For example, the lowest possible average that gives an A- for the year is 3.15.

Quizzes: In many lectures, you will receive a few problems to complete in class, covering material from the current and previous lectures. The problems are similar in spirit to the Exercises and Review Problems in the textbook. These quizzes provide a measuring stick for what you know and do not know before the exams. They also reward you for doing practice problems in the text and understanding the material. The quiz component of your final grade is the average of the 15 highest quiz marks that you receive.

Lab Assignments: Each week, there are data analysis problems to be completed in lab. Labs provide hands-on experience in analyzing data under the guidance of the TAs. The labs teach you how to apply the skills discussed in lectures and readings.

You are graded on lab reports that must be turned in by the end of the assigned lab period. Late lab reports will not be accepted. The lab component of your final grade is based upon the 8 highest lab marks that you receive.

Lab reports should be completed in your assigned lab section, unless you are given permission by the instructor or a TA to complete the lab in another section. This is necessary because space in the lab is at a premium. In some cases you will be permitted to begin the lab before it is due, but you may not work in 01 Old Chemistry during other class sections; we need the space.

Exams: The course webpage has links to instructions for the exams and study materials. Each exam is cumulative, and will cover all class material to that date.

ACADEMIC HONESTY

You are expected to abide by Duke's Community Standard for all work for this course. Violations of the Standard will be reported to the Dean of Students for adjudication; the minimum penalty for cheating is failure in this course. Ignorance of what constitutes academic dishonesty is not a justifiable excuse for violations.

For in-class quizzes and exams, you are required to work alone and for only the specified time period. For labs, you are allowed and encouraged to help each other, but each person must complete the lab report on their own.

POLICY FOR GRADING ERRORS

Every effort will be made to mark your work accurately. We are on your side, and want you to receive every point you have worked to earn. However, sometimes grading mistakes happen. If you believe that an error has been made on an quiz, lab report, or exam, please return the paper to the instructor within two weeks, stating your claim in writing.

The following claims will be considered for re-grading:

- (i) points are not totaled correctly;
- (ii) the grader did not see a correct answer that is on your paper;
- (iii) your answer is the same as the correct answer, but in a different form (e.g., you wrote a correct answer as $1/3$ and the grader was looking for .333);
- (iv) your answer to a free response question is essentially correct but stated slightly differently than the grader's interpretation.

The following claims will *not* be considered for re-grading:

- arguments about the number of points lost;
- arguments about question wording.

Considering re-grades takes up valuable time and resources that TAs and the instructor would rather spend helping you understand material. Please be considerate and only bring claims of type (i), (ii), (iii), or (iv) to our attention.

ADVICE FOR SUCCESS IN THE COURSE

DO AS MANY PROBLEMS FROM THE TEXT BOOK AS POSSIBLE!!!

The best way to learn statistics, or any quantitative subject, is to work problems. Although you don't have to turn in problems from the book, working them on your own on a consistent schedule will greatly improve your understanding of the material. Also, the web problems, in-class problems, and exams are based on the concepts covered by the problems in the text, so a solid understanding of these problems increases the chance you will earn a high grade in the course.

Most sections in the text are followed by a set of exercises. We recommend working these problems as you read. There are also review exercises at the end of most chapters. We recommend doing these a few days after reading the chapter to solidify your understanding. Answers to the

exercises are in the back of the book, and answers to review problems are available from the TAs in the Statistical Education and Consulting Center.

Students who have success in Statistics 101 typically put in **at least 6 hours of work per week** outside of the classroom. You should set up a realistic study schedule in which you spread your work over the week. Leaving all your statistics studying to one night is a bad strategy, because you cannot make the intellectual connections needed to develop a thorough understanding of the material. There is a very useful handout describing strategies for studying for quantitative courses on the web site for Duke's Academic Skills Instructional Program (at the site, select "General Academic Skills handouts" and then "Problem-solving courses"). It's packed with good tips, especially for those who don't have much experience studying for quantitative courses at Duke.

We strongly encourage you to form a study group and work problems together. Evidence shows that students who work in groups in quantitative courses learn more and enjoy the course more than those who work alone (see the studies by Richard Light at Harvard University).

You may find that you want more help than can be provided in office hours and help labs. If so, we recommend that you obtain a statistics tutor from the Peer Tutoring Program (PTP). This is a free service.

Finally, visit the TAs and instructor when you get stuck or even when you figure something out and want to share your victory. Think of us as allies in your efforts to learn statistics. We are delighted when you master all the material!

LECTURE SCHEDULE

The following schedule may be modified as needed. Please read relevant chapters before coming to class.

Date	Material
8/24	Diagnostic Quiz
8/26	Chapters 1, 2
8/31	No readings—ethics of experiments
9/2	Chapters 3, 4, 5, 6
9/7	No readings—graphical methods
9/9	Chapters 7, 8
9/14	Chapters 9, 10
9/16	Chapters 11, 12
9/21	Chapters 13, 14
9/23	Chapter 15
9/28	No readings—probability examples
9/30	No readings—contingency tables
10/05	Review
10/7	Midterm I
10/12	Chapters 16-18
10/14	Chapter 19
10/19	Chapters 20, 21
10/21	Chapters 22, 23
10/26	Chapter 24, 25
10/28	Chapter 26, 27
11/2	Chapter 28
11/4	Chapter 29
11/9	Review
11/11	Midterm II
11/15	No readings—Bayesian methods
11/18	No readings—Bayesian methods
11/22	No readings—multiple regression
11/30	Review
12/9	Final Exam, 7-10, pm.