MATH 111-01, Elementary Probability and Statistics, Fall 2009

Math 111 - Introduction to Statistics - Fall 2009
Instructor: Jeff Hamrick
Course Syllabus

ON STATISTICS. The seeds of statistics—which is often considered a mathematical science quite distinct from mathematics itself—were sown in the 17th century, with the development of probability theory by Blaise Pascal and Pierre de Fermat. Probability theory itself arose due to interest in games of chance. In contrast to probability theorists (who propose probability models and then study those models with little regard for the random realizations generated by those models), statisticians are interested in the random realizations themselves (called **data**), and what those random realizations suggest about the parameters that govern the (perhaps unknown) underlying probability models.

A critical development in the history of statistics was the method of least squares, which was probably first described by Carl Friedrich Gauss in 1794. Early applications of statistical thinking revolved around the needs of states to base public policy on demographic, economic, and public health data. The scope of the discipline of statistics broadened in the early 19th century to include the collection and analysis of data in general. Today, statistics is widely employed in government, business, and the natural and social sciences, and computers are transforming the field at a breathtaking pace.

Statistics is widely considered an exciting, dynamic, and intrinsically interdisciplinary science. The work of statisticians powers search engines like Google, has proven critical to the exploration of the human genome, and is used by hedge fund managers to detect arbitrage opportunities (risk-free trading strategies that yield profit with positive probability) that are successful *on average* (called **statistical arbitrage**). *The New York Times* recently declared that statisticians will enjoy one of the highest-paying, highly-coveted careers over the next decade. I hope you'll enjoy learning a little bit about statistics this semester with me!

ON COURSE GOALS. Any student who successfully completes this course should understand the following:

- That statistics helps us acquire knowledge and make decisions;
- That variation occurs in every measurable process;
- That inferences about populations are made based on the characteristics of samples;
- That valid inference requires randomization (or good sampling techniques);
- That experiments are conducted to gain knowledge and identify associations;
- That valid conclusions can be drawn from experiments only when the experimental design is sound; and
- That because variation occurs, all inferences have probabilities that quantify the uncertainties associated with them.

In addition, students who successfully complete this course should have some basic familiarity with the most common statistical tests they will counter in further upper-division work at Rhodes College; namely, one- and two-sample tests on proportions and means, one-way ANOVA, the chi-square test, and the tests commonly associated with proper implementation and analysis of a linear regression model.

ABOUT ME. My name is Jeff Hamrick. I'm an assistant professor in the Department of Mathematics and Computer Science at Rhodes College. Please call me Jeff. My office is located in room 318 of Ohlendorf Hall. I will hold office hours from 11:00 a.m. - 12:00 noon on Mondays, 3:00 p.m. - 4:00 p.m. on Wednesdays, and 1:30 - 4:30 p.m. on Thursdays during the fall semester. My office number is 901/843-3253 and my e.mail address is `hamrickj@rhodes.edu`. There will be some information about this course on my web page (located at `http://faculty.rhodes.edu/hamrickj`), but most of the course information will be on Moodle. Please stop by my office anytime. If you're unable to make my office hours, let me know and we may be able to schedule an appointment at an alternate time.

ABOUT YOU. You should be hard-working and enthusiastic about learning! This course features a fairly traditional introduction to both descriptive and inferential statistics. You should have a strong working knowledge of high school algebra to succeed in this course. Additionally, you should already be familiar with—though you will have an opportunity to review—the appropriate use of techniques for illustrating data (pie charts, bar charts, histograms, line graphs, etc.)

ABOUT US. We will meet to talk about statistics and data analysis on Mondays, Wednesdays, and Fridays from 8:00 a.m. - 8:50 a.m. during the fall semester. We will meet in Ohlendorf Hall 225. We will use *The Basic Practice of Statistics*, by David S. Moore (ISBN: 1-4292-0131-5). We will more or less cover the entire book, though we will not necessarily cover every chapter or every section in every chapter.

ON ATTENDANCE. College policy effectively requires me to take attendance at the beginning of each class period. At the end of the semester, if your number of unexcused absences is less than or equal to three, I will add 3% to your final grade in the course. For each unexcused absence in excess of three, I will subtract 1% from your final grade in the course.

ON HOMEWORK. Problems from the textbook will be assigned during each class period. They are noted on the course outline. Feel free to work with your colleagues on these problems. You will have to respond to the daily homework problems through the *StatsPortal* made available by the publisher of our textbook, W.W. Freeman. The *StatsPortal* system will grade your homework and give you immediate feedback. Please don't fret constantly about the daily homework assignments. They constitute a small portion of your final grade in the course and are intended to give you an opportunity to review course material frequently. That said, you must do them consistently if you want to earn a high grade in the course.

Each day, I will allot a few minutes of class time for homework-related questions. We won't have enough time to discuss many questions, so please come to my office hours. **I will not accept late homework assignments under any circumstances.** Instead, at the end of the semester, I will drop your lowest three homework grades.

ON CLASS PROJECTS. Statistics is not a spectator sport. During the semester, we will complete 8-12 class projects that will vary in their size, scope, and nature. Some of the projects will require you to do some reading and then write a summary and find an interesting example. Other projects will require you to use the PASW Statistics package that we will be learning. A final project for the course will require you to undertake—including experimental design, data collection and/or experimentation, hypothesis testing, and interpretation—a more-or-less complete statistical analysis.

ON MIDTERM EXAMINATIONS. Four times during the semester, we will pause and take a brief, 50-minute midterm examination. Each examination will focus on material that we have recently (but not too recently) discussed in class. The days of the examinations are located on the course outline.

ON CALCULATORS. For the daily homework assignments and the class projects, you may use whatever computational resources are at your disposal. Typically, the primary resources you will want to use are Microsoft Excel, PASW Statistics, and your personal hand-held calculator(s). For the midterm and final examinations in this course, you are permitted to use a non-graphing calculator (in particular, a calculator that cannot store text or formulas). I personally prefer the Texas Instruments BA II Plus calculator, but please use a calculator you **understand** how to operate.

ON THE FINAL EXAMINATION. A final, written, comprehensive 2.5-hour examination will be held on December 11, 2009 at 1:00 p.m. in Ohlendorf 225.

ON GRADING. I've noticed that students are too focused on grades, to the great detriment of their own learning. If students put as much effort into actually learning material as they did worrying about their grades, their performance would be much better. Nevertheless, part of my job is to assign grades fairly and in a manner that reflects the high academic standards at Rhodes College. In this class, we will use the standard ten-point scale. "Plus" or "minus" grades will be assigned to students with grades close to the extremes of each ten-point bracket (plus or minus two points from the boundary of each bracket). **In general, I do not inflate grades. Specifically, I do not curve final grades in this course.**

Your grade in this course will be computed according to the following weights:

Component	**Weight**
Daily Homework Assignments	20%
Midterm Examinations	40%
Final Examination	10%
Class Projects	30%

ON MISSING EXAMINATIONS. I do not, under any circumstances, offer make-up examinations due to absence or sickness. You must plan on taking each examination. If you miss an examination, your grade for that examination will be a zero. I may allow you to use your final examination grade in place of zero midterm examination grade.

ON CHEATING. In this class, we will adhere to the provisions of the Rhodes College Honor Code. Please look at the instructions on each homework assignment and/or class project for specific restrictions on your interactions with other individuals or outside resources. **In general, if you aren't sure what the rules are, please ask me.** You may not work with other students on examinations and you may not use crib notes or your textbook during an examination. In general, if the Rhodes College Honor Council concludes that a student in this course has violated the honor code, I will adhere to the recommendations of the honor council. However, I reserve the right to lower a student's grade in this course if I sincerely believe that an infraction has occurred.