

Math 111
Elementary Probability and Statistics
Spring 2011

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Office Hours:
MW 2:00 – 3:30
Th 1:30 – 3:00
or by arrangement

Grades

Course grades will be determined on the basis of two midterms, a final exam, quizzes, daily exercises, homework, and three group projects. All graded activities will be combined into a weighted percentage (see below) that will be converted to a course grade on a scale that is at least as generous as the following:

93 – 100	A	80 – 83	B–	67 – 70	D+
90 – 93	A–	77 – 80	C+	63 – 67	D
87 – 90	B+	73 – 77	C	60 – 63	D–
83 – 87	B	70 – 73	C–	< 60	F

Final exam is scheduled Tuesday, May 3, 8:30 – 11:00 a.m. Depending on space availability, you might have the option of taking it Monday, May 2 at 5:30 p.m., or Saturday, May 7, at 8:30 a.m. However, do not plan on an alternate time; be sure that you are available Tuesday morning.

Midterm exams are *Thursday evenings*, February 24 and April 7, at 6:00 p.m. (If Thursday evening is not suitable for you, you will have the option of taking the exam at the regular class time on Friday.)

Quizzes There will be two brief quizzes early in the semester, on Tuesday, January 18, and Monday, January 31, at 6:00 p.m. The purpose of these quizzes is to give you timely feedback about your current understanding of the content of this course **before** important add/drop and withdrawal deadlines.

Daily exercises After nearly every class meeting, you will be given a set of exercises that will encourage you to think carefully about and practice computations related to the material introduced in the class lecture that day. These exercises will be posted on Moodle. They may require you to use software (see below) or pencil-and-paper. While you may work on daily exercises with other students and/or tutors in the Math Support Center, you must write up solutions to the daily review exercises in your own words. You will access solutions to these daily review assignments in the Math Support Center, grade your work, and then record your participation in this process on Moodle. Three times during the semester, you will be asked to bring a portfolio of your daily exercises to one of the statistics instructors or a Math Support Center tutor, to spot check the exercises and discuss them with you.

Homework Many times during the semester, you will be given a homework assignment that is somewhat more involved than a daily review assignment. While you are allowed to work with other students, or with assistance from tutors at the Math Support Center, on these assignments you must write out the solutions to each homework assignment in your own words.

Projects There are two main group projects, and you will also expand one or both of them later in the semester, which will be called a “third project”. Each project will ask you to synthesize skills and concepts from multiple class lectures and to present, by way of a particular application, your synthesis. Each project will require you to work in a group, and turn in a single scientific report on behalf of the group. In general, you will be able to choose the data for these projects from a collection of data sets that we have assembled for this course. Some of these data sets are from research projects undertaken by Rhodes faculty.

Attendance is expected in this course. Each day, I will pass around a sign-in sheet. Signing in for any person other than yourself is a violation of the Rhodes College Honor Code. Your first four absences (for **any** reason) will trigger no penalty. For each unexcused absence in excess of four, your final grade in this course will be reduced by 1%. You may not miss a quiz or midterm examination except under the terms of the policy on make-up and extensions policy (see below).

Weights of graded activities in determining your final grade are:

Quizzes	8%
Tests	20%
Daily exercises	14%
Homework assignments	21%
Projects #1, #2, and #3	15%
Final examination	19%
Periodic checks (by instructor/tutor) of your portfolio of daily exercises	3%

Software

We will use two statistical software packages. *Fathom* is a teaching tool that introduces and illustrates many of the important concepts of the course. *SPSS* is a professional statistical package that is widely used in research. (From time to time, Microsoft *Excel* may be useful as well.)

Moodle

Much of the course material will be passed electronically using Moodle. You will log into Moodle regularly and use it extensively over the semester to view course materials and hand in assignments.

Textbook There is no textbook for this course. Plentiful supplementary resources will be available in class and on Moodle.

Cell phones: Please turn them OFF.

Tutors for Math 111 will be available at the Math Support Center (upstairs in Ohlendorf) on a regular basis. The exact schedule will be announced soon.

Policy on homework collaboration

Working together with other people is a great way to learn statistics. I encourage you to work together on the daily exercises and homework, if you find that it helps you to learn. However, homework for this course is also graded, as part of your final course grade. Each student must write up his or her own homework solutions. By handing in homework solutions to be graded, you are promising that you took part in solving the problems, and that you are not just copying someone else's work. Handing in homework to be graded when you did not participate in solving the problems is a violation of the Honor Code.

Make-up Exams and Extensions on Assignments

Extensions on the due dates of assignments and individual re-scheduling of exams will be granted only for the following reasons:

- Serious and verifiable illness or medical emergency
- Participation in an *official* Rhodes College activity (e.g., course field trip, sports team travel)
- Religious holidays
- Major life event (such as birth, wedding, death) – your own or a close family member
- Other genuine emergency that is beyond your control

Notice that this is an extensive list. It does not, however, include situations in which the timing of an exam or assignment is simply inconvenient for you. In particular, there will be no accommodation for ordinary travel arrangements before or after college breaks.

If you wish to request an extension or re-scheduling because of a situation which can be known ahead of time, it is your responsibility to make arrangements in advance. Permission might not be given after the fact. You may be asked to make your request in writing.

In all cases, your instructor is the final judge of whether an accommodation is warranted.

About the course

Statistics is an exciting, dynamic, and intrinsically interdisciplinary science. Modern statistics is widely employed in government, business, and the natural and social sciences. 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 risk-free trading strategies that have a very high probability of yielding a profit for their clients.

Computers are transforming the field at a breathtaking pace. This semester, our approach to the two main tasks of statistical inference – constructing *confidence intervals* and executing *hypothesis tests* – will be motivated by simulations and visualizations in a software environment. These kinds of approaches are quickly coming to shape the way statistical analysis will be carried out in years to come. Because hard drive space is becoming much cheaper (i.e., it is easy to collect and store vast quantities of data) and processing speeds are becoming much faster (i.e., it is easy to do more things with data than ever before), the world of tomorrow will be dominated by the computer-driven data analysis we will undertake this semester.

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 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 be able to execute randomization-based tests using a software package like *Fathom*, as well as more traditional normality-based tests using a software package like SPSS. Students should be able to use either approach to undertake statistical investigations in appropriate upper-division work at Rhodes College. The tests we will learn from these two perspectives are: one- and two-sample tests on proportions and means, tests on Pearson correlation coefficients, the tests commonly associated with proper implementation and analysis of a linear regression model, and at least one of the following tests: one-way ANOVA, the Wilcoxon rank-sum test, tests for statistical significance of Spearman's rank correlation, and the chi-square test for association.