Math 106.02 and 106.03 — Elements of Statistics
Syllabus and Course Procedures — Fall 2012

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Office Hrs

Mon 10-11
Tue 9-11
Wed 2-3
Fri 10-11

Required Text Peck and Devore, Statistics: The Exploration and Analysis of Data, 7^{th} edition, Brooks/Cole (2012).

Course Material The following is an ordered section list. Some sections may be omitted or abbreviated to accommodate our tight time schedule, and some sections may not require written homework.

1.1 Why Study Statistics
1.2 The Nature and Role of Variability
1.3 Statistics and the Data Analysis Process
1.4 Types of Data and Some Simple Graphical Displays
3.1 Displaying Categorical Data: Comparative Bar Charts and Pie Charts
3.2 Displaying Numerical Data: Stem-and-Leaf Displays
3.3 Displaying Numerical Data: Frequency Distributions and Histograms
4.1 Describing the Center of a Data Set
4.2 Describing Variability in a Data Set
4.3 Summarizing a Data Set: Boxplots
4.4 Interpreting Center and Variability: Chebyshev's Rule, the Epirical Rule, and z Scores
2.1 Statistical Studies: Observation and Experimentation
2.2 Sampling
2.3 Simple Comparative Experiments
2.4 More on Experimental Design
6.1 Interpreting Probabilities and Basic Probability Rules
6.2 Probability as a Basis for Making Decisions
6.3 Estimating Probabilities Empirically and by Using Simulations
Appendix A The Binomial Distribution
7.1 Describing the Distribution of Values in a Population
7.2 Population Models for Continuous Numerical Variables
7.3 Normal Distributions
7.4 Checking for Normality and Normalizing Transformations
8.1 Statistics and Sampling Variability
8.2 The Sampling Distribution of a Sample Mean
8.3 The Sampling Distribution of a Sample Proportion
9.1 Point Estimation
9.2 Large-Sample Confidence Interval for a Population Proportion
9.3 Confidence Interval for a Population Mean
10.1 Hypotheses and Test Procedures
10.2 Errors in Hypothesis Testing
10.3 Large-Sample Hypothesis Tests for a Population Proportion
10.4 Hypothesis Tests for a Population Mean
10.5 Power and Probability of Type II Error
11.1 Inferences Concerning the Difference Between Two Population Means Using Independent Samples
11.2 Inferences Concerning the Difference Between Two Population Means Using Paired Samples
11.3 Large-Sample Inferences Concerning the Difference Between Two Population Proportions
12.1 Chi-Square Tests for Univariate Data
12.2 Tests for Homogeneity and Independence in a Two-way Table
5.1 Correlation (with referrals to Sec 3.4)

13.1 Simple Linear Regression Model (with referrals to Sec 5.2)
13.2 Inferences About the Slope of the Population Regression Line
13.3 Checking Model Adequacy (with referrals to Sec 5.3)
13.4 Inferences Based on the Estimated Regression Line
13.5 Inferences About the Population Correlation Coefficient
5.4 Nonlinear Relationships and Transformations
15.1 Single-Factor ANOVA and the F Test
15.2 Multiple Comparisons

Your Course Grade Your course grade will be determined as a weighted average as follows:

Homework*	18%	
Short Quizzes*	10%	
Statistical Lab Report 1	8%	
Statistical Lab Report 2	8%	
Midterm Exam 1	16%	Friday, October 5
Midterm Exam 2	16%	Wednesday, November 14
Final Exam	24%	

Final Exam for Math 106.02 — Friday, December 21, 1:30-4:30
Final Exam for Math 106.03 — Tuesday, December 18, 1:30-4:30

Grading scale is *approximately* : A (90-100), B (80-90), C (70-80), D (60-70), F (below 60)

* I will delete your lowest quiz and homework scores before calculating your final course average.

Homework Homework problems will usually be assigned and collected about twice per week. In addition to homework exercises from the text, in-class and out-of-class computer lab work may occasionally involve written exercises. Homework solutions should be legible and presented in a logical fashion, with problem number clearly indicated. You do not need to type your work, but please write neatly. I (and/or the grader) may give no credit to messy homework consisting of scratch work here and there, a few doodles, and a circled final answer. Besides the usual symbolic language of mathematics and statistics, good homework solutions should be accompanied by explanations and ideas written in complete English sentences.

Homework assignments are to be handed in at the beginning of the class period at which they are due unless I specify otherwise. No credit will be given to unexcused late papers. Do not leave your homework back at your dorm room! If you have a conflict with a due date because you are a student-athlete, tell me as far in advance as possible. If you have an excused illness, send me an e-mail as soon as possible. A student assistant will grade your homework and return it as quickly as possible. For simplicity, I will weight all homework assignments equally. I will delete your lowest homework score before calculating your final course average.

One of my favorite axioms is *Homework is where most of the learning happens in a course,* and I agree whole-heartedly. The payback from hours of hard work on home assignments will be a deeper understanding of statistics, high homework scores, and ultimately the likelihood of a high grade in the course.

Late Policy Homework assignments must be turned in to me at the beginning of the class period on the assigned due date, unless I specify otherwise. No credit will be given to unexcused late papers. If you have an illness or athletic schedule conflict, let me know as soon as possible.

Short Quizzes I've noticed over the past few semesters that students need extra practice solving problems in an exam setting. In-class quizzes are intended to provide such practice and give students feedback on how well they know the most important core topics of this course. If a student has a weakness in a particular area, better to find out on a quiz rather than an exam. There will be approximately four in-class quizzes. The in-class quiz will usually be about 10 minutes long and will consist of an exam-like problem or two on core course topics. I will delete your lowest quiz score before calculating your final course average.

Statistical Lab Reports In this course you will write two statistical lab reports. These reports will be both *statistical* and *technical writing* exercises. Particularly, the grade on your report will be weighted, giving 70% weight to mathematical and statistical correctness, and 30% to presentation.

Lab reports will be the formal written culmination of an in-class activity and related exercises that students will work outside of class. Students will work in pairs and each student in a pair should contribute

to all phases of the lab — in-class activity, outside work, and the final report, and each student in a pair will receive the same grade on a lab project.

Your final report should be of professional quality — typed, having a cover sheet, introduction, body, and results and conclusions. It should be well-written with good use of both technical and non-technical language, and displaying appropriate graphics. More specific details will be given per each lab assignment.

Exams There will be two midterm exams and one comprehensive final exam. The tentative dates for these exams are:

Midterm Exam 1 — Friday, October 5
Midterm Exam 2 — Wednesday, November 14
Final Exam for Math 106.02 — Friday, December 21, 1:30-4:30
Final Exam for Math 106.03 — Tuesday, December 18, 1:30-4:30

Software There will be a considerable amount of work done with the aid of the software package Minitab. All that you need to know about Minitab will be covered in class. Embrace Minitab from the outset, even if you are timid with software packages. I assure you Minitab is very easy to learn and use, and its ease is matched with the power to do many of the basic statistical analyses. Minitab is also a fast and friendly program for running simulations, which are instrumental in demonstrating the underlying statistical principles of probability and analysis.

Fast and powerful statistical software is a somewhat bittersweet pill. With today's powerful software, we can perform a plethora of analyses quickly and generate a ream of output, whether or not these analysis procedures are appropriate for the given data setting, and whether or not key validating assumptions are met. Knowledge and discipline must match the awesome computational power and speed of modern software!

Academic Honesty Any work you submit for credit in this course must result directly from your own understanding, thoughts, and ideas. Presenting the work of others as your own is strictly prohibited.

Disabilities If you have any disability and therefore may have need for some type of accommodation(s) in order to participate fully in this class, please feel free to discuss your concerns in private with Erin Salva, Coordinator of Disability Services, by calling her office at phone number 5453, or by sending her an email at salvae@kenyon.edu.