

**MATHEMATICS 206 — DATA ANALYSIS**  
**Syllabus and Course Procedures — Fall 2009**

**Instructor:** Brian D. Jones  
**Office:** 303 Hayes Hall  
**Phone:** 5386  
**e-mail:** jonesbd@kenyon.edu

**Office Hrs:** MTWRF 10-11

**Required Texts**

1. Peck and Devore, *Statistics: The Exploration and Analysis of Data*, 6<sup>th</sup> edition, Thomson-Brooks/Cole (2008).
2. Peck and Devore, supplemental sections to the above text. These are available to the public at <http://www.thomsonedu.com/statistics/peck>
3. Moore and McCabe, supplemental chapters to *Introduction to the Practice of Statistics*, 5<sup>th</sup> edition. These are available to the public at <http://bcs.whfreeman.com/ips5e/>

**Course Material** The following is a rough topics list. Some topics may be omitted or added, depending on our time schedule, and we probably won't have time to cover all topics. The case studies at the end will be covered on an if-time-permits basis, and they reflect a couple areas of data analysis that are growing rapidly — biology and forensics.

- Review of normal, t, chi-sq, F distributions
- Review of one-sample tests for mean
- Review of the two-sample setting
- Ch 13 - Simple Linear Regression and Correlation
- Ch 14 - Multiple Regression Analysis
- Ch 15 - Analysis of Variance
- Supplement - Random Effects Models
- Ch 16 - Nonparametric Statistical Methods
- Moore & McCabe Ch 14 - Bootstrap Methods and Permutation Tests
- Moore & McCabe Ch 16 - Logistic Regression
- Supplement - Loglinear Models
- Supplement - Mixed Models and Longitudinal Studies
- Moore & McCabe Ch 17 - Statistics for Quality: Control and Capability
- Case Studies in Microarray Analysis
- Case Studies in Density Estimation

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

Homework	20%	
Short Quizzes*	12%	
Class Participation and Activities	8%	
Data Analysis Project	16%	
Midterm Exam 1	12%	Friday, October 16
Midterm Exam 2	12%	Friday, December 4
Final Exam	20%	Sunday, December 20, 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 score before calculating your final course average.

**Homework** Homework problems will usually be assigned and collected weekly, sometimes twice per week. In addition to homework exercises from the text, in-class and out-of-class computer lab and SAS work will be assigned frequently. 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 may give no credit to messy homework that is difficult to read. Besides the usual symbolic language of mathematics and statistics, good homework solutions should be accompanied, where appropriate, 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.

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 data analysis, 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 plan to give approximately eight to ten quizzes, so their frequency will be roughly between weekly and bi-weekly. The quizzes will be about 15 minutes in duration, and may cover concepts and interpretations as well as statistical calculations. The goal of the quizzes is to serve as a feedback to me as to where difficulties lie in student understanding, in addition to serving as a motivator for students to stay current with the material. I will delete your lowest quiz score before calculating your final course average.

**Class Participation and Activities** It is important that all students be engaged in class discussions, group work, and activities. Therefore, this component of your grade is based on attendance, participation in class discussions and in-class lab activities, good

teamwork in group activities, your presentation of problems to small groups or the class, and scores on in-class problems which I occasionally collect.

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

Midterm Exam 1 — Friday, October 16

Midterm Exam 2 — Friday, December 4

Final Exam — Sunday, December 20, 1:30-4:30

**Data Analysis Project** For the data analysis project, you will work in pairs. You and your partner will design an experiment, collect the appropriate data, analyze the data, and write a formal report presenting your project from design to conclusions.

Approximately four weeks into the semester, you will be required to submit research hypotheses, an experimental design, and sampling plan. I will meet with each pair of students to approve their proposal — I say *approve* not to be dictatorial, but to assure the scope of your project is not too small and not too big. Approximately three to four weeks before the end of the semester, you will submit an analysis plan for my feedback.

Your final formal 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. The grade on your report will be weighted, giving 70% weight to mathematical and statistical correctness, and 30% to presentation.

More detailed requirements will be posted in a separate handout early in the semester.

**Software** There will be a considerable amount of work done with the aid of the software packages SAS and Minitab.

I am assuming that most of you have some familiarity with Minitab, since it is our analysis staple in Math 106. If you have never used Minitab, don't panic! Minitab is so easy to learn and use that you can pick up the menu navigation basics during class activities. I would also be happy to show anyone Minitab basics in office hours.

The SAS analysis software is popular in industry due to its statistical power and its ability to store, manipulate, and merge large data sets. Simply put, SAS is huge! In the 80's the SAS manuals used to form a stack about 4 feet high! We will only scratch the surface of SAS's capabilities.

Minitab, on the other hand, is limited in its analysis capabilities but is very easy to use for some of the more simple procedures. Minitab also is a fast and friendly program for running simulations, which are instrumental in demonstrating the underlying statistical principles of 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](mailto:salvae@kenyon.edu).