



## BA206 Quantitative Analysis for Business—Section A

Spring 2006- T Th 11:30 am - 12:45 pm

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Office Hours:	M	By appointment	} and other times by appointment
	T	2:30 - 3:45 pm	
	W	2:30 - 4:00pm	
	Th	10:00 - 11:15 am	
	F	By appointment	

### Catalog Course Description:

Introduction to the techniques and reasoning processes of statistical analysis. Emphasis on statistical reasoning and critical analysis of statistical evidence. Statistical software is used to support computational tasks. Topics include study design, data collection, descriptive statistics, elementary probability, discrete and continuous distributions, confidence interval estimation, tests of hypotheses for numerical and categorical data, quality tools, and simple linear regression. Prerequisite: MA 119 or higher mathematics course

### Course Objectives:

Students who fully participate in this course and engage it seriously will:

1. Understand the importance of variation in business and other settings.
2. Become familiar with fundamental techniques of probability and statistics as they relate to common business situations.
3. Learn to approach ambiguous problems in the following way:
  - Identify the problem and design a plan of attack for the problem
  - Collect relevant data
  - Process the data using an appropriate tool
  - Analyze and knowledgeably interpret the results
  - Effectively communicate the results to a decision-maker or other audience
4. Develop skill in applying industry-standard statistical software knowledgeably.
5. Become confident in their analytical skills.

### Prerequisite

MA119 or higher mathematics course. With permission, students may take this course simultaneously with a calculus course. *If you have concerns about your prior math preparation, please see me at once.*

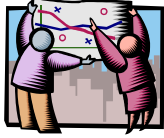
### Texts

*Required* Moore, David S., McCabe, George P., Duckworth, William M., Sclove, Stanley L. *The Practice of Business Statistics: Using Data for Decisions*. (New York: W.H. Freeman, 2003).  
Carver, Robert H. *Doing Data Analysis with Minitab 14*. (Belmont CA: Thomson-Brooks/Cole, 2004)  
*Note: As the author of this book, I will donate royalties received from our class to Stonehill College.*

### Course QuickPlace

Website: [http://quickplace.stonehill.edu/pp\\_rcarver](http://quickplace.stonehill.edu/pp_rcarver)  
Click on link to BA206

## Course Approach



We live in a world of uncertainty. The goal of statistical analysis is to calibrate, cope with, and manage that uncertainty. Business decisions, government policies, scientific research, news reporting, and public opinion are all shaped by statistical analysis and reasoning. Statistical thinking is at the core of the “quality revolution” in manufacturing around the world. In this course, you will engage in statistical thinking, discriminate among and use some fundamental statistical techniques of analysis, and perform real data analysis.

In the business context, according to the American Society for Quality, “statistical thinking” is a philosophy of learning and action based on the ideas that:

- All work occurs in a system of interconnected processes.
- Variation exists in all processes.
- Understanding and reducing variation are among the keys to success.

To be an effective analyst or a knowledgeable consumer of analyses in a business environment, you must **know how** to use them, **know when** to use them, and be able to **communicate** their implications. Knowing *how* involves mastery of fairly easy computational skills, and use of computer software. Knowing *when* requires an understanding of the theory underlying the techniques, and practice with applications of the theory. *Effective communication* requires a clear understanding of the theory and techniques, as well as clarity of expression, directed towards a particular audience.



Because these three skills are different, we will approach each of them in slightly different ways. Classes will combine lecture, demonstrations, group exercises, discussion, and hands-on practice. Assignments *outside* of class are essential to the learning process. In these exercises, you will “try your wings” with challenging problems. Ultimately one learns skills by *doing* them and learns concepts by connecting them to other ideas, so we will have many opportunities to practice them.

The course outline is my best guess about what material we will deal with each day. It is subject to change, but I will let you know when the schedule is changing. Changes will be announced in class or via e-mail.

Sometimes, we will discuss readings in great detail; at other times, I will expect you to be able to read and ask questions about the reading without a formal in-class presentation. Generally, I will devote class time to those topics that are (a) most important or (b) most difficult to comprehend. You should bring your book to class daily.

## Homework and Participation



*There are important topics that you will have to learn on your own by **reading** and **doing problems**...*

Your constructive and active participation is very important. Statistics is not a spectator sport; you will learn by doing rather than by watching. *Doing* means keeping up with reading and other assignments, working on homework problems, listening and participating actively in class, and asking those questions that you need answered. Attendance is a minimum requirement, but not sufficient to earn a good grade for participation.

The course outline lists *Problems to practice*; these are designed to check your comprehension of the reading and class presentations. I typically will not collect them, but may do so on occasion. The time you spend outside of class is critical to your success in the course. You should use these problems to gauge your own progress and seek help when you have a question about them. Most of these problems are answered in the back of the text, and many will be presented during class discussions.

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*Your homework should be professional in appearance. Grammar and presentation always count.*

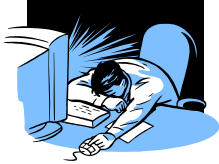
We will do 4 Homework Sets during the term. These will be distributed in class. I will collect Homework Sets at the start of class; late assignments will be downgraded one full letter grade for each day late. Completed problems should be on 8 1/2" x 11" paper (*not* torn from a spiral notebook) and should be clear, comprehensible, and professional in appearance, with one staple in the upper left corner. Each problem should be clearly identified on the page (you may use both sides of the paper), with computer output selectively incorporated as appropriate. *Sloppy homework may be returned as unacceptable.*

*I encourage you to work with a partner on Homework Sets. If you do so, turn in **one** set of solutions bearing both names. Be sure your name(s) and e-mail address(es) are on each assignment. Please clearly identify your final answers and important comments.*

*Interpretation is crucial...*

If a homework question asks for your interpretation or comments, this is may be the most important part of the problem; do not neglect such questions! Answer it fully, mindful of the conventions of English grammar.

*If you don't complete a problem, explain **why**....*



*If for some reason you cannot complete a particular problem you must **write a brief explanation of your difficulty**, perhaps even describing what you would do if you could overcome the particular hurdle. E.g.: "I couldn't determine the value of X; if I knew X, then I would use the following formula to complete the problem..."*

If you wish to have copies of recent homework before it is returned (to study for a quiz or test) you should keep a photocopy.

### Office Hours and Extra Help!



My regular office hours are listed on the first page of the syllabus. These are times when you know you will find me at my desk; feel free to stop in to ask questions, review homework or tests, or get help.

You should also feel free to call or email me with your questions. If my regularly scheduled hours are inconvenient for you, call to make an appointment at another time.

In addition, the course TA will offer weekly review sessions. Times will be announced early in the semester.

### Software

We will use a professional statistical package called **Minitab** for most our analysis. Minitab is widely used in universities, especially among business students. According to Minitab, Inc., colleges represent only 20% of their sales; the remaining 80% are in businesses and government agencies in the U.S. and abroad. Among the leading Minitab users are General Electric, Ford Motor Company, Dupont, Chrysler, Nokia, Lucent Technologies, General Motors, NASA, Kodak, Polaroid and British Telecom.

### Project

Teams of students will carry out a complete statistical investigation using the techniques introduced in class. Details of this project will be distributed in class. The project will be completed through a series of smaller, structured assignments.

### Academic Honesty

There are many opportunities in this course for students to work and learn together. Much of your grade depends on work done outside of class. We all understand the difference between learning together and handing in someone else's work. Individual assignments, quizzes and exams must be your own. I refer you to the student handbook or the college catalogue regarding the College's policy on Academic Honesty, and invite any questions on the subject.

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**Quizzes**

There will be *five* short (10- to 15-minute) quizzes during the semester. Quizzes help to assess your progress in understanding the reading and class materials, and may help to motivate you to keep up. *If you miss a quiz for any reason, it cannot be made up; however I will drop your lowest quiz grade.* **Quizzes are closed-book, but you may bring in a 3x5 index card with notes.**

**Exams**

There will be two in-class exams and a comprehensive final exam. Together, the two exams will count 35% of your entire grade. Exams are cumulative, emphasizing recent material. **They are also closed-book, but you will be able to bring one 8 1/2 x 11-inch page (two sides) of notes into the exam;** I will collect your notes with the exam. You will also be expected to use Minitab during the tests.

**Makeup Exams**

The Business Administration department has adopted the following policy:

Permission to miss an exam should be requested **in advance**. If you are unable to contact me directly, please leave a voice mail or email message as to where you can be contacted. Compelling reasons, such as illness or a death in the immediate family, are generally acceptable, while, for example, outside activities or more than one exam in a day, are not.

**Translation:** call or e-mail me *before* a test or quiz begins if you hope to take a makeup. Unless we speak beforehand, expect to fail any test or quiz you miss, except under the most compelling circumstances.

**Special Concerns**

If there are circumstances that might affect your performance in the course (e.g. learning issues, family crisis), please let me know as soon as possible.

**ADA accommodations**

If you are seeking classroom accommodations under the Americans with Disabilities Act, you are required to register with the Center for Academic Achievement, located in Duffy 109. To receive academic accommodations for this class, please request an accommodation letter from the Center for Academic Achievement and meet with me at the beginning of the semester.

**Evaluation**

Your final course grade will be determined as follows:

<i>Criterion</i>	<i>Weight (%)</i>
Participation & homework	10
4 out of 5 Quizzes	10
In-class exams (2)	35
Project	15
Final Exam	30
<b>TOTAL</b>	<b>100</b>

**Course Schedule**

On the last page is a preliminary schedule of each class session. **We will follow this schedule as closely as practical.** If the schedule needs to change, I will notify you.

In the table on the next page, please note the dates for quizzes, exams, homework, and project deliverables. The *Readings* column refers to chapter sections both in the Practice of Business Statistics (PBS) and *Doing Data Analysis* (D) books; you should read the noted sections before coming to class. **Before coming to class, try to complete the Problems to Practice; if you can do them, you have understood the reading. If you cannot do them, you'll know what to look for in class.**

I recommend that you read the assigned sections closely prior to class, and then re-read them after the class presentation. Some of the concepts in this course are difficult to grasp upon first exposure for most people. You should expect to need to re-read some sections to understand them fully.

Wk	Cls	QZ	HS	PD	DATE	CLASS TOPIC	Reading Due before class *	Tasks/Problems to Practice before class #
1	1				Tue Aug 29	Introduction to Statistical Thinking		
2	2				Thu Aug 31	Meeting Minitab & graphing data	PBS 1.1; D1, D2	<b>On-line survey</b> ; 1.2, 1.5, 1.15, 1.17
2	3				Tue Sep 5	Examining Distributions numerically	PBS 1.2; D4	1.27 (just make 2 stemplots); 1.53; D2: 5, 6, 8, 9
3	4	Q1			Thu Sep 7	The Normal Model	PBS 1.3; D8 (100-110); Normal Applet	1.63, 1.67, 1.69, 1.71
3	5				Tue Sep 12	Producing Data; Helicopter Lab	PBS 3; Sampling applet	<i>Prepare Helicopters</i> ; 3.3, 3.11, 3.36, 3.45; 3.74
4	6		H1		Thu Sep 14	Describing Relationships	PBS 2.1 - 2.3; D3	2.15, 2.24, 2.25, 2.33, 2.39
4	7			P1	Tue Sep 19	Describing Relationships	PBS 2.4 - 2.5; D5	2.39, 2.59, 2.71, 2.85
5	8				Thu Sep 21	Randomness and Probability	PBS 4.1-4.3	4.9, 4.35, 4.46, 4.60, 4.70, 4.71
5					Tue Sep 26	<b>Exam 1</b>		
6	9				Thu Sep 28	Randomness and Probability	PBS 4.1-4.3	4.9, 4.35, 4.46, 4.60, 4.70, 4.71
6	10			P2	Tue Oct 3	Sampling Distributions and the Central Limit Theorem	PBS 4.4	4.82, 4.87, 4.99
7	11		H2		Thu Oct 5	Sampling Distributions and the Central Limit Theorem	PBS 4.4	4.82, 4.87, 4.99
7					Tue Oct 10	<b>No Class: Academic Development Day</b>		
	12	Q2			Thu Oct 12	Probability Rules and the Binomial Distribution	PBS 5.1-5.2; D7	5.1.5.5, 5.11, 5.24, 5.39
	13				Tue Oct 17	Conditional Probability	PBS 5.4	5.65, 5.69, 5.71, 5.73, 5.74
8	14				Thu Oct 19	Introduction to Inference	PBS 6.1	6.4, 6.5, 6.21, 6.27
8	15			P3	Tue Oct 24	Intro to significance testing	PBS 6.2-6.3; Test of Signif applet	6.31, 6.37, 6.45, 6.51, 6.75, 6.77
9	16		H3		Thu Oct 26	Using significance tests	PBS 6.4	6.81, 6.87
9	17	Q3			Tue Oct 31	Inference for one or two proportions	PBS 8.1 - 8.2; D11	8.5, 8.11, 8.358.37, 8.49, 8.55
10	18				Thu Nov 2	Inference for one or two proportions	PBS 8.1 - 8.2; D11	8.5, 8.11, 8.358.37, 8.49, 8.55
10					Tue Nov 7	<b>Exam 2</b>		
11	19				Thu Nov 9	Inference for two-way tables	PBS 9.1-9.2 ; D13 (173-179)	9.11, 9.17, 9.25
11	20			P4	Tue Nov 14	Inference for one mean	PBS 7.1; D10	7.7, 7.27, 7.36
12	21	Q4			Thu Nov 16	Inference for two means	PBS 7.2; D12 (153-161)	7.57, 7.61, 7.62
12	22				Tue Nov 21	One-way ANOVA Concepts	D14	
13					Thu Nov 23	<b>No Class: Thanksgiving Break</b>		
13	23		H4		Tue Nov 28	Regression inference	PBS 10.1; D16	10.2, 10.9, 10.17, 10.21, 10.22
14	24				Thu Nov 30	Regression inference	PBS 10.2-10.33	10.27-.29, 10.43-10.45
14	25	Q5			Tue Dec 5	Multiple Regression	PBS 11.1-11.2; D 18	11.1, 11.7, 11.8, 11.9, 11.10, 11.29
15	26			P5	Thu Dec 7	Multiple Regression	PBS 11.3; D19	read only
					<b>Thu Dec 14</b>	<b>Section A Final Exam 1:30 PM</b>		

\* Complete these readings before class. "PBS1.1 - 1.2" means "read *Practice of Business Statistics*, Sections 1.1 through 1.2."  
"D1" means "read Session 1 in *Doing Data Analysis with Minitab 14*."  
# Complete (or attempt) these problems before class. "1.5" means "Problem 1.5 in P.B.S." Many of these will be discussed in class.