

**The Katz Graduate School of Business  
University of Pittsburgh**

**MBA**

**BQOM 2401: Statistical Analysis:**

*Uncertainty, Prediction and Quality Improvement*

**Fall 2010**

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**Course:** In this course, we study how to use partial information (based on a sample or historical data) to draw conclusions about the underlying population or predict the future. We will consider three major subjects in our analysis. First, we will learn how to make inferences about the population based on sample data. Second, we will study simple and multiple regression; these techniques are useful for prediction and forecasting. Finally, we will examine statistical process control that provides us with the ability to monitor a production process or service quality.

The emphasis of this course is on learning the methodologies, seeing their applications, and interpreting computer outputs rather than on studying the underlying mathematical details. After successfully completing the course, you will be equipped with the model formulation and technical skills that are required in subsequent courses in the MBA program, such as finance, marketing, and decision technology courses.

**Text:** Statistics for Business and Economics, by James T. McClave, P. George Benson, and Terry Sincich. Prentice Hall. 11<sup>th</sup> Edition. 2011.

Along with the textbook, you are also provided with *The Microsoft Excel Manual* and *The Student Solution Manual*, which give the solutions to all the odd-numbered exercise. Please contact me if you want additional references on any particular topic.

**Computer Software:** The focus of this course is on learning statistical concepts and modeling. As learning aids, we will use the data analysis module of Excel<sup>®</sup> along with an Excel add-in for many of the homework exercises, exams, and the required case analyses. We will also use a commercial standalone statistical package, SPSS. The SPSS software is available through the university's software distribution service (412-624-4357) for a very modest charge. If you need help in learning any of the other statistical packages available, please contact me.

**Evaluation:** There will be two exams, four case analyses, five quizzes, and homework assignments

First exam:	33 %
Second Exam:	37 %
Homework	6 %
4 Team Cases:	16 %
5 Quizzes:	<u>8 %</u>
	100%

- Homework:

Homework problems are assigned after each class and are due in following class. A tentative list of homework exercise problems for each session is enclosed. The homework problems will be graded on a *Satisfactory/Not Satisfactory/Not Attempted* scale. The corresponding grades for each problem would be 100%, 60% and 0%. To get a satisfactory, you will have to show that you have tried the problem. You can discuss the problems with your colleagues, or use the student solution manual as a guide.

You must submit your work independently. Each problem will have the same weight. Your worst two homeworks will be dropped in computing the overall homework grade. There might be some slight changes depending on the material that I can actually cover in the class, and I will announce these changes, if any, in the class.

The solutions to all the homework problems will be posted on Courseweb (if not given in the student solution manual) after they are due. Doing homework regularly will help you better understand the concepts discussed in the class.

Please write your Mail Box number on all your submissions, date due and the Chapter number.

- Quiz:

Five quizzes will be given during the course, and will cover the materials discussed since the previous quiz or exam. The objective of these quizzes is to make sure that we keep up-to-date with the associated text and homework exercises. The quizzes will be held in the first five minutes of the designated class. The best five out of the six scheduled quizzes will be used in the grade computation.

- Exam:

Both exams will contain a computer-based problem solving part, followed by a non-computer based multiple choice part. In the computer part, you will be required to use your laptops, but allowed to open only those files that are specified in the exam. The non-computer part will be closed book and closed notes. However, you are allowed to bring one 8.5 x 11 formula sheet (both sides) for the exams. More information on the exams will be provided in class.

- Case:

The four cases will be on hypothesis test, simple linear regression, forecasting, and quality management. They are team projects to be done in group of 3-4 students. Submitting your cases late will not be accepted. Discussions of any type on the group case study must be limited to only with those in your group.

- Class Participation:

Attendance is required. I know you have a very busy schedule and face difficulty in getting enough time to study. This makes it all the more important to learn the materials in class. My goal is to teach effectively, and your dedication is very much needed. Please keep up with the class, so the exam and quiz time won't be overwhelming.

**Ethics Integration:** Where appropriate, ethics in statistics discussions will be added to emphasize the importance of ethical behavior when collecting, analyzing, interpreting, and reporting on data with statistics. Students will be constantly reminded with examples and cases, and required to apply sound statistical methodology. They will be able to recognize when unethical statistics are inappropriately employed. Whenever suitable, corporate social responsibility and sustainability will be addressed as well.

**Pre-class Reading:** Every class has a pre-class reading. This relates to the material that we will be covering in class. To make the class most effective, you are strongly encouraged to read the assigned chapters and the power point slides (on Courseweb) prior to coming to class. In addition, glance through the *Statistics in Action* sections to gain an understanding of how statistics is applied in practice.

**Make-up Exam:** In general, there will be no make-up exams. In the event that extraordinary circumstances prevent you from taking the exam at the scheduled time; you must contact the instructor *prior* to the examination day.

**Academic Integrity:** All exam and quiz work must be your own. Any collaboration, except between individuals of the same group for the group case analyses, is strictly prohibited. Any breach of academic integrity is an extremely serious matter and will be dealt with according to the KGSB academic integrity policy.

**Best Partner Practices:** For each course the Katz School has a series of partnerships with nationally known companies for their world-class business practices. The objective of this program is to make our courses more rigorous and relevant, and to involve our partners in the conduct of our classes. This is a mandatory lecture and the exam will have questions based on this lecture. More information on best practice lecture will be provided later.

**Students With Disabilities:** If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both me and the Office of Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890/(412) 383-7355 (TTY), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for you.

**General Communication:** In order to keep email blasts to a minimum, the primary means of communication would be through in-class announcements. Depending on the information to be conveyed, I will also use the Announcements page of Courseweb. When I believe that something is urgent and important, I will send an email to the entire class.

**Classroom Decorum:** Please maintain the classroom decorum. Please come to the class on time, and do not leave during the class unless it is absolutely necessary. Do not engage in conversations with your colleagues during class. Do not use your laptops unless it is for work related to this class. Also, please turn your cell phones off, unless you are expecting a telephone call regarding a medical emergency. Even in this case, please sit near an exit and leave quickly so that others are not disturbed.

**Recitations:** Weekly recitations will be held on Fridays from 8:00 am to 9:00 am as per the schedule announced by the MBA office. The recitations will go over the additional problems, including homework problems. Please make sure that you attend the recitations if you are having any difficulty with the course material.

**Office Hours:** Please see me if you need any clarifications regarding the material. Generally, I follow an open door policy. However, we will also set-up office hours during the first class meeting.

## TENTATIVE SCHEDULE

<b>Session No. &amp; Events</b>	<b>Date (week of)</b>	<b>Topic</b>	<b>Learning Objectives</b>	<b>Pre-class Reading (+ online ppt)</b>	<b>HW Assignment</b>
1	08/31/10	Introduction & Overview; Continuous Random Variables	Why statistics is important in business?  Normal distribution & Application	Section 4.6	4.95, 4.101 4.212
2	09/02/10	Sampling Distributions	Describing the distribution of Sample Means and Proportions; The importance of the Normal distribution: Central Limit Theorem	Sections 4.10 - 4.11	4.171, 4.178, 4.217, 4.227
3	09/07/10	Estimation with Confidence Interval I	How do we estimate the population mean or proportion using sample data?	Section 5.1-5.3	5.13, 5.34, 5.35
4	09/09/10	Estimation with Confidence Interval II	How reliable is our estimate? Determining sample size How to determine the sample size?	Section 5.4-5.5	5.47, 5.71, 5.98, 5.107
5 Quiz 1	09/14/10	Hypothesis Testing: Single Sample I	Does the evidence support our premise? Single sample tests for sample means with large samples;	Sections 6.1 - 6.3	6.9, 6.11, 6.13 6.23, 6.26, 6.33
6	09/16/10	Hypothesis Testing: Single Sample II	$p$ -values; Single sample tests for small sample means	Sections 6.4-6.5	6.48, 6.57, 6.6.59, 6.62, 6.126
7	09/21/10	Hypothesis Testing: Single Sample III	Proportions	Sections 6.6	6.75, 6.115, 6.129, 6.134
8 Quiz 2	09/23/10	Two Sample Inferences I	Estimating the difference of two means Conducting two-sample tests Independent sampling,	Sections 7.1 -7.3	7.13, 7.19, 7.21, 7.33, 7.38
9	09/28/10	Two Sample Inferences II	Paired difference experiment, Compare population proportions, Sample size	Sections 7.3 -7.5	7.49, 7.57, 7.70, 7.113, 7.115

10 Quiz 3	09/30/10	Linear Regression I	Fitting the model using Least-squares Computing and evaluating model parameters Using Excel; Correlation and Coefficient of Determination	Sections 10.1- 10.4	10.23, 10.35, 10.50
11 Case I due p. 446	10/05/10	Linear Regression II	Using the model for estimation and prediction	Sections 10.5- 10.6	10.69, 10.81, 10.98 (a-e)
12	10/07/10	Linear Regression III	Interpreting computer outputs from different packages Review	Sections 10.7	10.96
13	10/12/10	<b>NO CLASS</b>	MBA Career Service Week		
14	10/14/10	<b>NO CLASS</b>	MBA Career Service Week		
15 Case II due (handout)	10/19/10	Covariance	Risk reduction in a stock-market portfolio: Diversification	Handout	Handout
16	10/21/10	<b>Exam Preparation and Q&amp;A Day</b>			
17	10/26/10	<b>Exam</b>	In Class		
18	10/28/10	Discuss Exam; Multiple Regression I	1 <sup>st</sup> -Order with multiple independent variables;	Sections 11.1- 11.4	11.21, 11.31

19	11/02/10	Multiple Regression II	Model building	Sections 11.5-11.10	11.57, 11.73, 11.85, 11.90, 11.95
20	11/04/10	Multiple Regression III	Diagnostics of assumption violation	Sections 11.11 - 11.12	11.111, 11.148, 11.149
21	11/09/10	<b>NO CLASS</b>	Professor Shang Attending Conference		
22 Quiz 4	11/11/10	Time Series I	Time series, Seasonal factor,	Sections 13.2-13.4	13.17, 13.43
23	11/16/10	Time Series II	Autocorrelation	Sections 13.6-13.9	13.49, 13.53
24 Case III (handout)	11/18/10	Process Control and Improvement I	Statistical process control charts	Sections 12.2-12.6	Ignore A-B, B-C, Boundaries. 12.13, 12.29, 12.41
25	11/23/10	<b>NO CLASS</b>	THANKSGIVING BREAK		
26	11/25/10	<b>NO CLASS</b>	THANKSGIVING BREAK		
27	11/30/10	Process Control and Improvement II	Process capability analysis Six Sigma	Section 12.8	12.53 (only part b, find $C_{pk}$ ), 12.77
28 Case IV p. 806-7	12/02/10	Non Parametric tests	Nonparametric statistics;	Section 14.1 – 14.7	14.9; 14.25; 14.35; 14.51; 14.59; 14.71
29 Quiz 5	12/07/10	Design of Experiment	Completely randomized, Randomized block, and factorial designs	Section 8.1-8.5	8.27, 8.31, 8.43, 8.59, 8.91
30	12/09/10	Categorical Data Analysis; Review	Testing Category Probabilities: One-way Table, Two-way Table	Section 9.1-9.4	9. 9.29, 9.47, 9.50
	Week of 12/13/10	Final Exam	Date to be announced by MBA Office		