

# QBA 201

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## *Introduction to This Study Guide*

This study guide contains the lessons for Quantitative Business Analysis (QBA 201) as well as additional information regarding the more challenging aspects of the course. Directions for submitting lessons can be found on pages iv through vi. Further information is given in the following sections.

### *Welcome to QBA!*

As a statistics instructor, I have experienced a variety of teaching situations and audiences. During several quarters, I worked with students overseas. Although the instruction was in English, it was not their native language. Other experiences have included doctoral students focusing on research design and advanced statistics. Most of my experience, however, has been with undergraduates in Quantitative Business Analysis. Regardless of the situation or the audience, a concern regarding numbers was always expressed. “I don’t like working with numbers.” I understand that feeling; we all like different things. That’s probably the reason that a well-known ice cream chain doesn’t just make vanilla!

Most of us are not math whizzes. In fact, the successful students in QBA are usually not math geniuses. They are people like you and I. They are individuals who take their education seriously; they are willing to invest their time in reading, doing, and thinking.

### *What are “Statistics?”*

Statistics are used to gather information from data. Your authors define statistics as “the science of collecting, organizing, presenting, analyzing, and interpreting data to assist in making more effective decisions.”

Suppose you want to rent an apartment in Athens. Naturally, you're curious about the typical price for monthly rent and you begin to gather information. You collect the following monthly rent figures:

456 300 476 312 369 500 419 367 356 452 300 468  
390 415 300 568 389 467 418 490 300 367 315 476  
456 300 312 352 468 469 300 389 568 467 478 431

At first glance, these numbers look confusing. Imagine if we had hundreds of figures! With a little effort, however, we can squeeze information from this mass of numbers. For example, we can calculate the average rent to be 407.22. We notice that the rent figures range from 300 to 568 making the range equal to 268. These are statistics which we can use to describe the data.

### *Course Objectives: Where We're Heading.....*

Before starting this course, Ohio University requires that you have taken either Math 163A or 263A as well as Math 250. Any deviations from the two prerequisite courses should be discussed with your advisor.

The course will start with a review of statistics such as those calculated for the rent data above, called descriptive statistics. In addition, the normal curve and associated probabilities will be discussed.

After the review, the course moves to sampling distributions. Most of the course will deal with samples. In fact, statistics are numbers describing a sample. Using a sampling distribution, we will be able to determine interval estimates for the values of the population. For example, we gathered a sample of rents for the apartments in Athens for the purpose of estimating the expected cost of renting ANY apartment in Athens, our population of apartments.

Next, the topic of hypothesis testing is studied. In order to make any decision, whether it be to accept a shipment of paper cups or to determine what brand of cereal has more raisins, hypotheses are tested. Therefore, the steps of hypothesis testing are examined.

Later, the important topics of correlation and regression are introduced. These analyses are used to predict values for variables. In selecting students to admit to the university, the admission director is interested in variables that will predict success in higher education. Are the scores on a college admission test related, or correlated, to success in college? Is the amount spent in advertising related to sales?

Finally, the course concludes with non-parametric methods. Specifically, we will be discussing chi-square analyses. The chi-square test of independence is often used with questionnaire data. Suppose your company is considering a new health-care package. Human resources may gather opinions on this new package. In addition, the person's job position is noted. The chi-square test of independence could be used to determine a possible relationship between job position and attitude toward the proposed health-care package. Are people in management more supportive of the health-care package? Why is that?

## *Textbook*

Mason, R., Lind, D., and W. Marchal, *Statistical Techniques in Business and Economics*, 10th edition, Boston: Irwin McGraw-Hill, 1999.

This text has been used on campus for several years with great success. Students praise the readability of the explanations as well as the fact that the examples are tied to business situations. Homework problems will be assigned to sample the various topics covered in the lesson. In addition, students are expected to complete the self-reviews throughout the material. Since the answers to the odd-numbered problems throughout the chapters are found in the back of the book, these are a good source of additional practice.

## *Calculator*

What type of calculator do I need for the course? This is a common question that I hear frequently. We all know that it is possible to purchase a calculator that will do everything except make your lunch! There are three basic things that you need on your calculator: a square root key, a key marked "LOG," and a key marked "10<sup>x</sup>." If your calculator has other functions, that is fine. Remember on homework and tests, it is important for you to show all of your work. If you can check some of that work with your calculator, fine.

## Lessons

Each lesson is divided into four parts: (1) the objectives, (2) a discussion of the material, (3) the reading assignment, and (4) a homework assignment. It is my recommendation that you work through the material in that order.

The objectives are designed to focus your reading of the material. As you might surmise, these are the points which I feel are important in each lesson. Additionally, they serve as review topics. After working through the material, you should feel “comfortable” with these topics.

The discussion of the material found in the study guide patterns the classroom lectures. It is my hope that the discussion section will serve to smooth the rough edges. They are intended to reinforce the information in the book.

The reading assignment specifies the pages in the text. Keep in mind that you are reading statistics, not the latest best seller. As I said previously, the text is readable, but your mind must be “tuned in.”

Finally, the homework assignment will be given. Remember, the homework problems are a sample of the topics covered for the lesson. (Additional practice is highly recommended.) Generally, homework will be scored as +1 for a correctly done problem and 0 for a problem with no correct components. A score of 1/2 point is assigned to partially correct problems. It is important for you to show all of the necessary calculations for each problem. This work enables me to see your thinking and correct any misconceptions.

Since this is a math course, a word about rounding is necessary. As you work the problems on your homework and the exams, allow the numbers to “ride” on your calculator. Your final answer should be two places past the decimal. If your answer appears to be different from mine, I will use my calculator to follow your work. This is another important reason to include your calculations with your work.

Three of the lessons—5, 9, and 13—are the three exams. These lessons contain study guides for the exams and directions for applying to take them. If you master the material as we progress through the course, you should feel comfortable working through the review lesson. Any confusion or holes in your understanding should be easily resolved. I encourage you to set the exam date as soon as you successfully complete the review lesson. **DON'T PUT IT OFF!!** Then, look over the reading assignments, written assignments, and the discussion in the study guide. Having reviewed the material, you're ready for the exam and will do well.

## Completing the Course

Independent Study courses have been designed to allow interaction with your instructor and feedback on your assignments. You will make the best progress if you set a regular schedule to work on your lessons and submit your assignments. In order to benefit from your instructor's comments, you should normally wait to submit a lesson until the previous one has been graded and returned to you. If you have a deadline for completing the course, you may submit up to three lessons at one time, after Lesson 1 has been returned and with your instructor's permission. Trying to complete the course too quickly defeats the purpose of the interaction and may result in your receiving a lower grade because you have not considered your instructor's comments and help for each assignment.

## Grading Policy

First Midcourse Examination	25%
Second Midcourse Examination	25%
Final Examination	25%
Homework Assignments (Averaged)	25%

The three exams are each worth one-fourth of your grade with the remaining one-fourth of your grade coming from the average of your homework assignments. The exams will consist of two parts. The first part will be multiple-choice questions designed to measure the concepts studied. While definitions may be included in this section of the test, the focus will be on application of the concepts. For example, you not only need to be able to define a "discrete" variable, you would also need to identify a discrete variable from a list of choices.

The second half of the test will typically consist of problems. These problems will be similar to the assigned homework exercises. In other words, if you haven't worked a type of problem for homework, it won't be on the test. Since partial credit will be given for test problems, it is important that all calculations be written on the test.

For each exam, you will be given a sheet of relevant formulas for the material. The formulas won't be labeled with words; they will be written and identified with the appropriate symbols. For example, the formula for the sample mean would be written as:

$$\bar{X} = \frac{\sum X}{n}$$

You will also be permitted to have a calculator during the exam.

The final letter grade will be determined according to the Ohio University scale:

93 - 100%	=	A	73 - 76%	=	C
90 - 92	=	A-	70 - 72	=	C-
87 - 89	=	B+	67 - 69	=	D+
83 - 86	=	B	63 - 66	=	D
80 - 82	=	B-	60 - 62	=	D-
77 - 79	=	C+	Below 60	=	F

## *Course Outline for QBA*

<i>Lesson Number</i>	<i>Topic</i>	<i>Reading Assignment</i>
1	What are Statistics?	Chapter 1
2	Descriptive Statistics	Chapter 3, 4 (sections)
3	Normal Curve	Chapter 7
4	Sampling Methods and Estimation	Chapter 8
5	First Midcourse Examination Information	
6	Hypotheses—Large Samples	Chapter 9
7	Hypotheses—Small Samples	Chapter 10
8	Correlation and Simple Regression	Chapter 12, 15 (sections)
9	Second Midcourse Examination Information	
10	Multiple Regression	Chapter 13
11	Nonparametric Methods	Chapter 14
12	Time, Series, and Forecasting	Chapter 18
13	Final Examination Information	