

ECONOMICS 201: STATISTICS

Spring 1998

Online Syllabus

Contents:

- [Contact Information](#)
 - [Course Description](#)
 - [Teaching Philosophy](#)
 - [Readings](#)
 - [Use of Computers:](#)
 - [Calculator](#)
 - [Spreadsheet](#)
 - [Internet](#)
 - [Grading](#)
 - [Problem Sets](#)
 - [Exams](#)
 - [Regression Project:](#)
 - [Partner](#)
 - [Proposal](#)
 - [Data description](#)
 - [Final paper](#)
 - [Comments on writing](#)
 - [Honor Code](#)
 - [Schedule](#)
-
-

Contact Information

Class meetings:

120 Wilson Hall
MWF 10:10-11:00am (Section 2)

Professor:	David Lucking-Reiley
-------------------	--------------------------------------

Office Hours:	MW 8:30-9:30am, or by appt.
Office:	202 Calhoun Hall
Office phone:	322-2482
Email:	reiley@vanderbilt.edu

Course Home Page: <http://www.vanderbilt.edu/Econ/reiley/econ201/home.html>

Course Description

This course serves as an introduction to statistics for students interested in economics and business. Students should have some knowledge of calculus: on occasion, we will use a derivative or talk about the integral of a function. The Department of Economics and Business Administration requires this course of all its majors and minors.

Statistics is the art of formal persuasion using quantitative evidence. It involves collecting information (data), using mathematical techniques to draw out useful information, and reporting the statistical results to others in a way that tells a convincing story.

Benjamin Disraeli once classified three types of dishonesty: "there are lies, damned lies, and statistics." Certainly, many people have been known to abuse statistical techniques in order to bamboozle others, to "prove" statements which aren't true. However, a careful and skeptical person can learn to recognize when statistics are being abused: sometimes statistical results are sloppy or intentionally misleading, but sometimes they contain real truth.

My goals are for each student in this course to:

- Develop an appreciation for careful data collection, through hands-on experience.
- Understand how to use descriptive statistics to summarize data informatively.
- Learn to use statistical estimation techniques to estimate various economic quantities from a sample of data. Examples of such quantities include the effectiveness of a drug at curing ulcers, the difference in income between high-school graduates and college graduates, and the probability of a firm's assembly line turning out a defective product.
- Understand how estimates based on a smaller *sample* of data can be used to make inferences about a larger *population*.
- Learn to use regression to quantify relationships between different variables. For example, we may use regression to estimate the slope of a demand curve: that is, the relationship between the price of a product and its quantity demanded.
- Understand that all statistical results involve some uncertainty. For example, we might find a statistical argument that an increase in the interest rate by the Federal Reserve Board has a tendency to decrease the rate of inflation. The key word here is *tendency*. Even if the inflation rate *usually* decreases as a direct result of the Fed's action, it may not happen every single time -- other unexpected factors, such as oil shortages, may drive inflation up. Sometimes newspapers (and other sources) report uncertain statistical results as if they were certain; this is misleading. In this

- course, we will not only recognize the uncertainty in statistics, but also learn to quantify the amount of this uncertainty.
- Learn to recognize when statistical techniques are being abused in order ostensibly to "prove" some point.
 - Write an interesting paper about a real-world phenomenon, using statistics in an accurate and convincing way.
 - Develop an intellectual appreciation for probability and statistics. Not only are these concepts useful in practical situations, they also involve some mathematics which is interesting in itself.
-

Teaching Philosophy

I want to make this course interesting and thought-provoking, and one from which you will remember some important lessons even after the final exam is over.

I plan to reserve our class time (a precious resource) for two-way communication: questions, discussions, and cooperative problem-solving. Most of the one-way communication in this course will happen through assigned readings. In order for the interactive class format to work, you should do two things: (1) **Make sure to complete each day's assigned reading before coming to class**, so that we can discuss it and you can ask questions about anything you didn't understand. When doing the readings, try a few problems out of the book to check your understanding. (2) **Be ready to think and talk when you come to class**. In order to make sure that everyone has the chance to participate in class, I will call on each student from time to time.

Whenever you don't understand something, either from the readings or from class, please ask a question. Often other students are having the same difficulty as you are and all can benefit from the exchange. I need your feedback to make the course meet your needs.

This brings me to my final point. I believe that the deepest learning occurs when students teach themselves. Therefore, I expect you to do most of your learning through the readings and assignments, both on your own and in cooperation with your classmates. My job is to help you proceed through this learning process with the minimum possible frustration. For example, when you get stuck on a page of reading you don't understand; don't waste many hours on it, but instead make a note of it to ask me in class or via an email message. Similarly, when you get stuck on a math problem you can't solve, I can give you a hint. The book can't interact with you, but I can, and that's what I'm here for. (You should also ask questions of your classmates and of the TA.)

Some students benefit less from my teaching style than others. If you prefer a traditional, lecture-based course, I recommend that you immediately investigate one of the other sections of Econ 201 offered by the economics department. I recognize that different students have different learning styles, and I won't be offended if you decide to switch out of my section.

The material in this course is sometimes quite difficult, so you should expect to work a lot outside of class. Expect to spend about six to ten hours per week doing readings and assignments. (If you find yourself having to spend more than ten hours a week on this course outside of class, please let me know so that I can do something about it.)

Readings

Reading assignments will come mainly from the required text: *Statistics for Business and Economics*, sixth edition, David R. Anderson, Dennis J. Sweeney, and Thomas A. Williams. In addition to the main chapters outlined in the syllabus, make sure to **read the appendixes** in each chapter which deal with the software program Microsoft Excel (such as Appendix 2.2).

I also encourage you to read a newspaper or magazine regularly during the course of the semester, so that you can be on the lookout for the use of statistics in the real world. If you find an interesting article which demonstrates the use (or abuse) of statistics, please bring it along to class for discussion. Students who regularly contribute to class in this way will receive a boost in their final grades.

Use of Computers

Technology makes the subject of statistics a lot less tedious. In the "old days," students had to compute many long sums by hand, and the use of large sets of data was nearly impossible, because it took too much time to do each calculation.

Calculator

You may wish to obtain a reliable calculator to help you with the arithmetic on homework and exams. Any calculator with a square root key and the ability to store a number should suffice. You may find it useful to have a factorial ($x!$) key as well.

Many of you may find a calculator to be totally superfluous, however, since we'll have computers available in class for use on exercises and exams. Anything a calculator can do can also be done on a computer with a spreadsheet.

Spreadsheet

Microsoft Excel is a computer program designed to work with data. It provides a number of commands designed to do the types of statistical computations we will be discussing in class. Excel (and computers in general) can automatically perform large numbers of calculations which otherwise could become quite tedious. You will be using Excel to some extent for almost every assignment in this class, and the textbook shows, with plenty of examples, how to use the software for the statistical tasks you'll be learning. (The book also provides examples for using the program Minitab, which you are welcome to use instead of Excel if you feel so inclined.)

Excel is available on all the computers in the Garland, Branscomb, Wilson, and Stevenson computer laboratories on campus. (Minitab is available in Garland and Branscomb.) If you prefer to work on your own computer, you can also buy your own copy of Excel, which is available both for Macintosh and for Windows systems. Last time I checked, the price was \$45 at the Vanderbilt Computer Store.

You should have at least two 3.5-inch disks to store your computer work. One should be used as a backup; you should never keep important files on only one single disk.

Use of the Internet

On a related note, I also require all my students to learn how to use both electronic mail and the World Wide Web. Both are important communication tools. For example, you might have a question about a particular homework problem, and you may find it more convenient to ask me via email than to come by during my office hours. I tend to reply to student email messages very quickly, almost always on the same day as I receive them. To ensure that your message gets a high priority, you should make sure to put the phrase "Econ 201" somewhere in the subject line of your message.

I also maintain a list of email addresses of all of the students in my class. I use this list to make occasional announcements and clarifications. For example, I may discover an article on a World Wide Web site that has a particularly interesting use of statistics, and I will email everyone the location so that they have a chance to read it. Or I may ask you to download a data file from the World Wide Web, so that you can use the data on your homework without having to type all the numbers into the computer for yourself. Also, when a student asks me a question via email and I feel the answer would be of general interest to everyone in the class, I may send out my answer to everyone so that all may benefit from the question. I feel that such techniques save time and energy for all concerned. (It even helps to save trees, by allowing me to cut down on paper handouts.)

But what if you don't yet know how to use the Internet yet? One place to start is with your friends; I have discovered that the majority of Vanderbilt students already use email regularly, so you may be able to find someone to help you set up your email account and show you how to use the necessary software. Another place to try is the office of Academic Computing and Information Services (telephone 343-1631); as it is their job to support students in the use of computing at Vanderbilt. If neither of these options work for you, I will be happy to try to help you myself.

The only Internet skills you will need for this course are: (1) learn how to send and receive email messages, and (2) learn how to find the course home page and follow hypertext links using a Web browser (such as Netscape Navigator). If you own a personal computer, you may also want to purchase the appropriate Internet Connection Kit from the Vanderbilt Computer Store, so that you can use the Internet from the convenience of your dorm room.

Please [send me an email message](#) with the subject line "Econ 201" as soon as possible, so that I can put you on my course mailing list. You should try to check your email regularly during the semester, at least once or twice a week, in order to make sure you receive the full benefit of the messages I send.

Grading

Your final grade will depend on four different elements: a series of problem sets (20%), three midterm exams (12% each), a final exam (24%), and a team project (20%).

Problem Sets

You will have a problem set due almost every week in this course. I will hand them out a week in advance, and they will generally be due on Wednesdays. The problem sets are designed to help you learn the material that will be tested on exams. You should feel free to discuss the problems and check answers with your classmates, as I believe that such out-of-class discussions can enhance your learning experience. However, I do expect each student to prepare his or her own writeup independently, to demonstrate independent understanding of the problems. Merely copying someone else's written work is a violation of the Honor Code.

A late problem set will receive a score of zero. Thus, in terms of grading, you will be better off turning in an incomplete assignment than trying to complete it late.

Exams

The exam schedule divides the course roughly into fourths. However, knowledge in this course is somewhat cumulative, so please do not allow yourself to forget everything you learned in one section of the course before we move on to the next section. The final exam will be explicitly cumulative, with some emphasis on the material from the last fourth of the course. No make-up exams will be given; if you miss an exam, you will receive a **zero**, so please plan travel arrangements accordingly. I will not be scheduling an alternate final exam.

Regression Project

For this project, you will have to apply what you have learned in this course to explain an economic phenomenon using regression analysis. You will complete this project with a partner over the course of the semester. You and your partner will collect your own data on variables that you expect to be related to each other, and use regression and other statistical techniques to give a convincing explanation of the relationship. Possible topics include:

- Observe the prices of individual breakfast cereals at the supermarket, as well as other attributes of each cereal, such as weight, calories, grams of sugar per serving, and so on. Explain how the price of the cereal depends on the other attributes.
- Consult a computer catalog and show how the price of a computer depends on the speed of the CPU, the amount of RAM, the hard disk size, and so on.
- Observe the prices of paintings for sale in local Nashville art galleries. Show whether or not there is a relationship between the painting's price and its various other attributes, such as size (in square inches), medium used (oils, watercolors, etc.), and age of the artist.
- Find the fraction of the popular vote earned by President Clinton in each state in the 1996 election, and discover whether the votes he earned varied according to the state's unemployment rate, per capita income, or other statewide variables.
- Consult a college guide to find current tuition levels and other attributes (student/faculty ratios, national rankings of research faculty, urban versus rural location, etc.) of a sample of colleges. Estimate the relationship between price and these other attributes.
- Find attributes that influence the prices of real estate sold in Nashville.
- Survey Vanderbilt students to see whether the number of dates they've had in the past month is related to height and to GPA, separately for men and women.
- Survey Vanderbilt students about their email usage. Does the number of messages they've received in the past week depend on class year, gender, and/or number of siblings?

- Find salaries for a sample of professional baseball players. Use regression to show how salaries depend on batting average, number of strikeouts, number of errors committed, and number of games played.
- Explain death rates from cancer (at the state or county level) as a function of per capita income, education, urbanization, and race. Get help from a librarian if you don't know where to find the relevant data.

Your project will result in a paper of about ten pages in length. This paper should address the following:

Why did you choose to investigate this particular relationship? What's interesting about it?

Why did you choose your particular explanatory variables, and what effects did you expect them to have?

- Where did you obtain your data?
- How are the variables measured? Are there any oddities in the data set?
- Provide descriptive statistics for each of the variables.
- Justify the regression model you have used.
- Estimate the parameters of the regression model.
- Evaluate the statistical significance of the individual coefficients and of the model as a whole.
- Explain your findings in terms which would be meaningful to the average college student.
- Write a convincing explanation, both of why the topic is interesting and why one should believe your results.

You will choose your own topic, either one from the list above or one of your own devising. I value creativity and insight in the papers I read, so you should give serious thought to coming up with your own topic (it could really help your grade).

The data you collect should include at least 40 observations (of cars, people, houses, months, etc., and their associated characteristics). More observations tend to make statistical arguments more convincing, so you should collect as many observations as you can without the task becoming onerous. As you collect the data, enter the observations in a file on disk, and keep a backup copy of the disk. Lost disks and disappearing data will not be accepted as a valid excuse for lateness of the project.

So that you can get some idea what the final project will look like, I will be putting several copies of past regression project papers on reserve in the library under "Econ 201 Section 2." I encourage you to take a look at these papers in order to generate ideas for your own project; I will try to include a wide variety.

Partner

As noted earlier, this project is to be completed with a partner. **Please email me** by the end of the second week of the semester to let me know your preferences regarding a partner. If you already know someone you'd like to work with, let me know who it is. If want me to match you up with someone, let me know this as well. The sooner you let me know, the sooner you can get started.

You should start thinking about your topic as soon as possible. Though the final paper is not due until the last week of the course, there will be two preliminary assignments during the course of the semester. As noted on the schedule below, you will be asked to turn in (1) a proposal for your topic, (2) a printout of your data along with a discussion of the relevant descriptive statistics, and (3) your final paper.

Proposal

For the proposal, I expect for you to write about 2 pages, describing what the idea for your project is, why it's interesting, what relationship you expect to find between the variables, and how you plan to collect your data. Make sure that it's feasible for you to be able to get at least 5 variables and at least 50 observations. At the stage of your proposal, I will give you feedback to guide you in the later stages of your project. The better your proposal, the better the feedback I can give you. Also, what you write at this stage should form the basis for the introductory section of your final paper (indicating exactly what you're doing in the paper, and why you're doing it).

Data description

For the second project paper, later in the semester, you will have to collect your data and describe what it looks like. This will be about 2-3 pages of text, plus supporting figures and tables. You'll want to give details about exactly how your variables are defined and how you collected them, as well as descriptive statistics on each of the individual variables. (A statistical investigation of the relationships *between* variables will be the focus of the final part of the project, after we've studied regression analysis.) For quantitative data, you'll want to present means, standard deviations, and histograms (and any other descriptive statistics you think are appropriate). For qualitative data, you can just present proportions, and perhaps a bar graph if you have more than two categories for any given qualitative variable. Make sure to point out any features of the data you think are particularly interesting. (Does the data lie in the range you expected? Are there any strange outliers?) This assignment will become a substantial section of your final paper, as well.

Final paper

Your final paper will summarize all the work you did for the project. An introductory section will present motivation for the project, a clear description of the relationships you initially hypothesized, and so on. A second section will describe your data: how you collected it, what each of the variables looks like, and what you think is most interesting. The main section will present the results of your regression analysis of the relationships between variables. You'll also want a concluding section. You are free to include other statistical results (hypothesis tests, etc.) that you think are interesting, and you may organize the paper as you see fit, as I do value creativity. However, the preceding sentences should provide a valuable outline.

Comments on writing

Your papers should be presented in a professional manner: typed, and easy to read. The text of each paper should be well written, with appropriate graphs and tables included. Plan to complete the paper in time to have a classmate proofread it for you, so that you can make revisions before turning in a final draft. As noted, you should plan for the text of the paper to be approximately ten pages long, plus additional figures and tables which may be either integrated with the text or included as appendices. (This page count is flexible - you could write as few as five pages of text, or as many as fifteen. In total, however, you should plan to turn in no more than 25 pages, including all appendices. I will not accept a paper longer than 25 pages in total.)

I consider writing about statistics to be an important skill, and I hope to help you improve on your writing in this class. One way I intend to do this is to hold in-class writing workshops on days when your project

papers are due. Therefore, on days when assignments are due for the regression project, I would like you to bring **two copies** of your assignment to class: one to turn in to me for credit, and one to discuss with your classmates during class.

I will put examples of several past student papers on reserve in the library, so that you may get an idea of what a good project looks like.

If you would like advice or clarifications about any aspect of the project during the course of the semester, please don't hesitate to ask the professor or TA.

Honor Code

Vanderbilt's Honor Code governs all work in this course. I will report to the Honor Council any instances of cheating, including turning in problem sets not written up independently, collaborating during exams, or using prepared notes during closed-book exams. Please contact me if you are unclear about how the Honor Code applies to the this course.

[\[return to course home\]](#) [\[course schedule\]](#)

Last modified: September 3, 1998