

TUFTS UNIVERSITY
Medical School

Course CMBA0264-01
Statistics with Applications
Summer 2009

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OH: by appointment

STATISTICS WITH APPLICATIONS

Two Credits – 20 Hours

Class Meets: Jaharis Building at 150 Harrison Avenue on the first floor in room 156. (Medical School campus, Boston)

Tuesdays, 6:30-8:45pm – 6/16-8/11

Data sets and other materials will be posted at the course web page:

<http://www.tufts.edu/~mbiancon/CMBA0264-2009.html>

Course Objectives:

This is a 10 week, 2.0 credit course focusing on learning and practicing basic statistical methods with applications. Statistics is a discipline on its own and it provides the tools for data management and analysis. Econometrics is a general area that refers to a combination of statistics and mathematics applied to economic, business, management and finance in general. The course will stress the basic theory and "hands on" statistical analysis using the STATA software (other software of your choice and versatility is allowed).

In particular, the branch of statistics called descriptive statistics is concerned with organizing and presenting information in a meaningful way by summarizing data numerically and displaying it in various types of charts and graphs. Inferential statistics refers to a large variety of methods used to derive useful information from a sample of a larger whole population. These methods are part of the working knowledge of many different professionals, from researchers in the biological and physical sciences to economists, financial planners and accountants.

This course will focus more on inferential statistics and parametric methods with finance and management applications. We will learn how to engage in statistical modeling and analysis and also how to be informed consumers of statistical models, analytical methods and results in the relevant literature of interest to students.

Course Requirements:

One Mid-Term Exam (30%), Tuesday, July 21 - 6:30-7:30PM
One Term Paper (30%), Due on Thursday, August 13, by 5:00PM (Proposal due on July 28)
Practice Problem Sets and Written Reviews (40%)

Please Note: If you prefer to take notes on your computer, of course, you are free to do so; it is not recommended though. You are not allowed to use a laptop computer for e-mail, internet access regarding other classes or projects etc. while in class.

Recommended Text:

Ashenfelter, Orley, Phillip Levine and David Zimmerman (2003) Statistics and Econometrics: Methods and Applications. Wiley, New York, NY. A solid book that provides a straight forward coverage of the basic statistics and extends into statistical and econometric modeling.

Additional Texts:

Keller, Gerard and Brian Warrack (2003) Statistics for Management and Economics, Sixth Edition. Duxbury Press, Pacific Grove, CA. This is an introductory statistics textbook that is valuable for its variety of applications. (Any edition is acceptable).

Newbold, Paul, William Carlson and Betty Thorne (2008) Statistics for Business and Economics, Sixth Edition. Prentice Hall, NJ. A well-written textbook for introductory statistics. (Any edition is acceptable as well).

Stock, James and Mark Watson (2006) Introduction to Econometrics, Second Edition. Addison-Wesley, Reading, MA. A solid textbook that is simple and effective. It presents the main materials with few data sets.

Wooldridge, Jeffrey (2008) Introductory Econometrics. Fourth Edition. Thompson-South Western, Mason, OH. This is a careful and detailed introduction to Econometrics with special attention to modern developments in theory and practice and up-to-date applications.

Required Readings (tentative):

Ayres, Ian (2007) Super Crunchers: Why Thinking-by-numbers is the New Way to Be Smart. Bantam Books, NY, NY. This is a new book for a general audience that explains and discusses the works and ideas of Ian Ayres from Yale University. Reading this book along this course is

important for your understanding of the use and application of statistical tools to modern issues in evidence-based medicine, economics and behavioral problems.

[Levitt](#), Steven and [Stephen J. Dubner](#) (2005) Freakonomics: A Rogue Economist Explores the Hidden Side of Everything. William Morrow, NY. This is a widely publicized recent book that synthesizes and explains the works and ideas of Steven Levitt from the University of Chicago. This may be construed as a modern version of Beckerian economics of everyday life.

Taleb, Nassim N. (2007) The Black Swan: The Impact of the Highly Improbable. Random House, NY. Popular book on the fallacies of statistical theory and practice.

Orwell, George (1946) "Politics and the English Language." A Collection of Essays, George Orwell. Harcourt Brace, New York, NY (1981). Essay about writing and transmitting ideas and thoughts with the English language. To be handed out in class.

Other readings from professional journals will be assigned depending on topics and general class interest.

Software:

STATA: The software used for this course is STATA, currently on version 10. You can order a (student) copy of Stata at <http://www.stata.com/order/new/edu/gradplans/gp3-order.html>. The version you will need for this course is Small Stata, although the more powerful (i.e., more expensive) versions would work also.

Hamilton, Lawrence C. (2006) Statistics with STATA, updated for 10. Duxbury Press, NY. This is a text that shows you how to use the software STATA. Note that STATA does not have a single manual available; several reference manuals and books are available. The Hamilton book gives a good introduction of the main commands needed and other commands and instructions will be either provided in class, or at STATA website.

Outline of classes and materials (*tentative*):

Each class will consist of two parts, separated by a short break

Class 1: Tuesday, June 16:

- Introduction; Experiments, Random Trials and Statistical Inference: An Introduction. Ayres (2007)
- Probability Theory and Basic Statistics Review. Ashenfelter et al (2003), Chs. 2-9 and Appendix A.
- Introduction to STATA
- Applications: Principles of Risk Management

Class 2: Tuesday, June 23:

- Basic Statistics Review;
- Two-Variable Ordinary Least Squares (OLS) Estimation, Inference; Bivariate Linear Regression. Ashenfelter et al (2003), Chs. 9-10. Applications from Keller and Warrack (2003), Stock and Watson (2006) and professional journal readings.
- STATA applications

PRACTICE PROBLEMS DUE

Class 3: Tuesday, June 30:

- Multivariate Ordinary Least Squares (OLS) Estimation, Inference, Multivariate Regression and Nonlinearities. Ashenfelter et al (2003), Chs. 11-13.
- Applications from Campbell et al (2007), Keller and Warrack (2003), Stock and Watson (2006) and professional journal readings.
- STATA applications

PRACTICE PROBLEMS DUE

Class 4: Tuesday, July 7:

- Multivariate Ordinary Least Squares (OLS) and Nonlinearities, Multivariate Regression and Nonlinearities. Ashenfelter et al (2003), Chs. 11-13.
- Applications from Campbell et al (2007), Keller and Warrack (2003), and professional journal readings.
- STATA applications

Class 5: Tuesday, July 14:

- Multivariate Ordinary Least Squares (OLS): Heteroskedasticity and Serial Correlation; Heteroskedasticity and Serial Correlation, Ashenfelter et al (2003), Ch. 14.
- Applications from Campbell et al (2007), Keller and Warrack (2003), and professional journal readings.
- STATA applications
- Introduction to Regression Analysis of Time Series;
- STATA applications, professional journal readings.

MID-TERM EXAMINATION: Tuesday, July 21 - 6:30-7:35PM

Class 6: Tuesday, July 21- 7:50-8:45PM:

- Regression Analysis of Time Series; STATA applications.
- Analysis of Time Series Processes. Ashenfelter et al (2003), Ch. 17. Applications from Campbell et al (2007), Keller and Warrack (2003), Stock and Watson (2006), and professional journal readings.

Class 7: Tuesday, July 28:

- Simultaneous Equations and Instrumental Variables. Ashenfelter et al (2003), Ch. 15.
- Applications from Keller and Warrack (2003), Stock and Watson (2006), and professional journal readings.
- STATA applications, professional journal readings.
- Guest speaker on July 28, 7:30-8:45pm: Dr. Patrick Purdon

PRACTICE PROBLEMS DUE
PAPER PROPOSAL DUE

Class 8: Tuesday, August 3:

- Digital Dependent Variables; STATA applications, professional journal readings. Digital Dependent Variables. Ashenfelter et al (2003), Ch. 16.
- Applications and professional journal readings.

Class 9: Tuesday, August 11:

- Panel Data Models; Ashenfelter et al (2003), Ch. 18. Applications from Keller and Warrack (2003), Stock and Watson (2006).
- STATA applications, professional journal readings.

TERM PAPER DUE: Due on Thursday, August 13, by 5:00PM

TERM PAPER: EMPIRICAL PROJECT

General Guidelines

- Final Papers to be written individually, min-max ~ 8-15 double spaced type-written pages (not including tables, graphs and regressions)
- Only final paper will be graded, intermediate inputs may be graded satisfactory/unsatisfactory
- Unsatisfactory inputs need to be refined and resubmitted

Project Details

- **Pick topic/data set:**
 - Few data sets will be proposed
 - Anything else you are interested in
- **Write ½ page “paper proposal” including:**
 - Question to be answered
 - Data source (include potential modifications if data is one of the proposed ones)
 - Outline of intended approach
- *Due after Mid-term examination on July 28.*

Term Paper to be handed in:

- Due on Th, August 13 by 5:00PM
- Min-max ~ 8-15 double spaced type-written pages (not including tables, graphs and regressions)
- Paper should include
 - Introduction – relevance of topic, background info, anything found in the literature on the topic
 - Discussion of what you expected to find and why
 - Description of data and descriptive statistics
 - Discussion of econometric analysis and results
 - Conclusions and summary
 - Bibliography