

AED Economics 205
Data Analysis for Business and Applied Economics
The Ohio State University
Autumn 2009

INSTRUCTOR

Dr. Eugene Jones
326 Agricultural Administration Building
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OFFICE HOURS

3:00 - 5:00 Monday & Wednesday

CLASS & LAB HOURS

9:30 – 10:34 Monday, Wednesday & Friday (Class)
Building and Room to be determined
3:00 – 3:48 Thursday & 10:30 - 11:18 Friday (Lab)
Howlett Hall, Room 272

TEACHING ASSISTANT

Name: To Be Arranged
Location: To Be Determined
Office Phone:
E-mail:
Office Hours: TBA

CLASS WEBSITE

<http://aede.osu.edu/class/aede205/jones/>

PREREQUISITES

Math 130 or its equivalent.

TEXTBOOK (Required)

Anderson, Sweeney, and Williams, *Modern Business Statistics with Microsoft Excel*, 3rd Edition, Thomson/South-Western, 2009.

Study Guide (Can be purchased from Amazon.com)

Loucks, John S., *Study Guide for Modern Business Statistics*, Thomson/Southwestern, 2006.

Haddon, Mark, *The Curious Incident of the Dog in the Nighttime*, Vantage Books, 2003. (An optional, but funny novel; it contains an application of Bayes' Theorem)

FACILITIES

Lectures will be held in Room 251 of the Agricultural Administration Building. Computer labs will be held in Room 272 of Howlett Hall. Each student is expected to develop computer skills and become proficient with Excel spreadsheets. Two lab periods are available: 3:00 – 3:48 on Thursday and 10:30 – 11:18 on Friday. These lab periods should provide sufficient time for you to complete your assignments. If you are unable to finish your lab, please note that additional lab hours are available in Howlett as well as in Room 05 of Ag. Admin. Building. For more precise times, check the schedules posted outside each lab room.

COURSE OVERVIEW

Agricultural Economics 205 is an introductory, five-credit course that emphasizes computer applications of the principles of probability and statistics to the problems of data collection, analysis, presentation, and interpretation in economics and business. The course is designed to meet the requirements of the major in Agribusiness and Applied Economics as well as satisfy the general education requirement in data analysis.

COURSE OBJECTIVES

A student completing the course should be able to:

1. present the salient features of economic and business data using summary measures and graphical techniques;
2. draw inferences and make projections using basic statistical techniques – probability distributions, sampling distributions, etc;
3. understand measurement and data collection problems that are typically encountered in economics and business;
4. deal critically with numerical and graphical arguments appearing in the mass media;
5. use regression equations to test competing hypotheses and quantify economic relationships among variables; and
6. use Microsoft Excel to analyze data.

COURSE ORGANIZATION

The course is organized into three 48-minute lectures and one 96-minute laboratory session per week. The lab sessions will be devoted to analyzing assigned data problems on the microcomputer using the software package, Excel. A Teaching Assistant will administer the labs and grade all lab and homework assignments.

Approximate times devoted to the topics covered in the course are:

<u>Topic</u>	<u>Chapter</u>	<u>Number of Lectures</u>
Introduction, Data Analysis and Descriptive Statistics	1, 2, 3	6
Basic Probability	4, 5, 6	7
Sampling and Sampling Distributions	7	4
Interval Estimation	8	4
Hypothesis Testing	9	3
Simple and Multiple Regression	14, 15	6
Total		30

EXAMS AND IN-CLASS EXERCISES

Two exams will be given: a midterm and a final. The midterm will be given during the lab periods on **October XXth and YYth**. **Please note that a special room will be assigned for the midterm exam.** The final exam is scheduled for Weekday, **December Xth, X:XX a.m. to X:XX a.m., and it will be given in Room TBD.** Additionally, five to seven short exercises will be given and these exercise will be graded (checked) and used to help substantiate class attendance and participation. **Each student will be granted two un-excused absences. Each additional absence will result in a loss of 5 points from a possible 100 points for class participation.**

Weighting Scale for Grades:

Class Attendance and Participation	10%
Homework	20%
Laboratory Exercises	20%
Midterm Examination	25%
Final Examination	25%

Required Points for Letter Grades

An **A** will require 95 percent of the total points on exams, labs, homework and class participation.

An **A-** will require at least 90 percent of the total points on exams, labs, homework and class participation.

A **B+** will require at least 87 percent of the total points on exams, labs, homework and class participation.

A **B** will require at least 84 percent of the total points on exams, labs, homework and class participation.

A **B-** will require at least 80 percent of the total points on exams, labs, homework and class participation.

All **C** grades will require total points on a comparable scale to B grades.

All **D** grades will require total points on a comparable scale to B grades.

There are no requirements for a grade of **E**.

SPECIAL NEEDS

Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs.

POLICY FOR LATE ASSIGNMENTS

No homework or lab assignments will be accepted after the due date. **This policy is adopted in the interest of fairness.** Students who work until midnight or later to complete their assignments are often infuriated with a policy that allows other students to turn in their assignments late.

As a general rule, each homework assignment will be made on a Wednesday and it will be due on Friday of the following week. Lab assignments will be due at the **beginning** of the following week's lab period. (Also, please note that you can turn in your homework assignment to your TA). Lab assignments received at the end of the lab period will be considered late. Your homework assignments can be turned in to me or the Teaching Assistant, but your lab assignments must be turned in to the Teaching Assistant. Neither the Teaching Assistant nor I can take responsibility for assignments left under our doors or in our mailboxes. Please note that everyone is expected to attend lab, even if you have a home computer with Microsoft Excel. During the quarter, each student is allowed **one, unexcused absence (not assignment)** from lab. Each additional absence will result in the loss of 5 points.

Some Practical Information

Data Analysis 205 is much like a math course in that it requires a lot of practice to be successful. To allow you to get sufficient practice, weekly labs and homework assignments will be given. Those who take the time to **work through** the homework and labs are quite successful in this course. This success follows from the fact that exams are just an extension of what is covered in the labs and homework assignments. In previous classes, some students have found shortcuts to **work through** their labs and homework assignments. From my recollection, these students have not scored in the top percentile on exams. Also, they have not been able to see a clear relationship among the homework assignments, labs and exams. To maximize your probability of success in this course, let me suggest that you avoid the temptation of taking shortcuts.

Academic Misconduct

Plagiarism and other forms of cheating will not be tolerated. University rules provide severe penalties for academic misconduct, ranging from course failure to dismissal from the university. University rules are found in the handbook used in all survey courses: "University Survey-A Guidebook and Readings for New Students."

For exams, please note that you will be allowed to bring one 8.5" x 11" sheet of paper with as many formulas as you can write on both the front and back of the sheet. Notes are not allowed on your formula sheet. Also, you must write your name on your formula sheet and turn it in with your exam.

COURSE OUTLINE
DATA ANALYSIS FOR BUSINESS AND APPLIED ECONOMICS

I. DATA and STATISTICS Chapter 1

- A. Applications of Statistical Information
- B. Definition of Data
 - 1. Elements
 - 2. Variables
 - 3. Observations
 - 4. Scales of Measurement
- C. Types of Data
 - 1. Qualitative vs Quantitative
 - 2. Cross-Sectional vs Time Series
- D. Data Sources
- E. Descriptive Statistics
- F. Statistical Inference

II. DESCRIPTIVE STATISTICS I AND II (Chapters 2 & 3)

- A. Summarizing Qualitative Data
 - 1. Frequency Distribution
 - 2. Bar Graphs and Pie Charts
- B. Summarizing Quantitative Data
 - 1. Frequency Distribution
 - 2. Relative Frequency Distribution
 - 3. Percent Frequency Distribution
 - 4. Histogram
 - 5. Cumulative Distributions
- C. Stem-and-Leaf Display (Exploratory Data Analysis)
- D. Crosstabulations and Scatter Diagrams
- E. Measures of Location
 - 1. Mean
 - 2. Median
 - 3. Mode
 - 4. Percentiles
 - 5. Quartiles
- F. Measures of Variability or Dispersion

1. Range
 2. Variance
 3. Standard deviation
 4. Coefficient of variation
- G. Measures of Distribution Shape, Relative Location, and Detecting Outliers
1. Distribution Shape
 2. Z-scores
 3. The empirical rule
 4. Detecting outliers
- H. Exploratory Data Analysis
1. Five-Number Summary
 2. Box Plot
- I. Measures of Association between Two Variables
1. Covariance
 2. Meaning of Covariance
 3. Correlation Coefficient
 4. Interpretation of Correlation Coefficient
- J. Weighted Mean and Measures of Location and Dispersion for Grouped Data
1. Weighted Mean
 2. Sample Mean
 3. Sample variance
 4. Sample standard deviation
 5. Population summaries from grouped data

III. BASIC PROBABILITY (Chapters 4, 5 and 6)

- A. Experiments, the Sample Space, and Counting Rules
- B. Assigning probabilities to experimental outcomes
- C. Events and their probabilities
- D. Some probability rules
- E. Conditional probabilities
- F. Bayes' Theorem
- G. Discrete probability distributions
1. Random Variables
 2. Expected value and variance
 3. Binomial Probability Distribution

- H. Continuous probability distributions
 - 1. Uniform Probability Distribution
 - 2. Normal Probability Distribution

IV. SAMPLING AND SAMPLING DISTRIBUTIONS (Chapter 7)

- A. Simple Random Sampling
- B. Other Sampling Methods
- C. Point Estimation
- D. Sampling distribution of \bar{x}
 - 1. Expected value of \bar{x}
 - 2. Variance and standard deviation of \bar{x}
- E. Sampling distribution of \bar{p}
 - 1. Expected value of \bar{p}
 - 2. Variance and standard deviation of \bar{p}
 - 3. Form of sampling distribution of \bar{p}
- F. Nonprobabilistic and Probabilistic Sampling Methods

V. INTERVAL ESTIMATION AND HYPOTHESIS TESTING (Chapters 8 and 9)

- A. Interval estimates
 - 1. Population Mean - σ known
Margin of Error and the Interval Estimate
 - 2. Population Mean - σ unknown
Margin of Error and the Interval Estimate
 - 3. Determining the Sample Size
 - 4. Population proportion
Determining the Sample Size
- B. Developing Null and Alternative hypotheses
- C. Type I and Type II errors
- D. Population Mean: σ known
One-Tailed Test
Two-Tailed Test
- E. Population Mean: σ unknown
One-Tailed Test
Two-Tailed Test

VI. SIMPLE LINEAR REGRESSION

- A. Least Squares Method

- B. Coefficient of Determination
- C. Assumptions or Least Squares Method
- D. Testing for Significance
- E. Using the Estimated Regression Equation for Estimation and Prediction
- F. Analyzing Residuals
- G. Determining Outliers and Influential Observations

VII. **MULTIPLE REGRESSION**

- A. Multiple coefficient of determination
- B. Model assumptions
- C. Testing for significance
- D. Using the estimated regression equation for estimation and prediction
- E. Categorical independent variables
- F. Residual analysis