Economic and Business Statistics – ECO 391–003
Syllabus

Spring 2017, MWF 9:00 - 9:50 a.m.
Business & Economics Building, Room 171

Contact Information

Instructor: Alex Combs
Office: 405 Patterson Office Tower
Office Hours: Monday 10:00 - 11:30 a.m. & Thursday 1:30 p.m. to 3:00 p.m. or by appointment
E-mail: alex.combs383@uky.edu
Course Website: Canvas (uk.instructure.com)

Text & Other Readings

1. Jaggia, Sanjiv and Alison Kelly. Business Statistics: Communicating with Numbers. McGraw-Hill Irwin.

   - Jaggia and Kelly have written an excellent statistics textbook for business and economics majors. This text along with the class preparation assignments provide a solid foundation for our course and will help you master the principles of economic and business statistics.

2. Freedman, David, Robert Pisani, and Roger Purves. "Chapter 1: Controlled Experiments" and "Chapter 2: Observational Studies" **(provided via Canvas)**

Course Description

Prerequisite: STA 291 (Statistical Methods) or equivalent

Many of the upper division courses in Accounting, Agriculture Economics, Analytics, Economics, Finance, Management, Marketing, and Public Policy use and build upon the statistical techniques and analysis learned in ECO391. This course provides a survey of statistical techniques relevant to modern economics and business, with major emphasis on estimation, hypothesis testing, correlation, modeling, analysis of variance, regression, and forecasting.

Student Learning Outcomes

We have the following eleven student learning outcomes for the course:

1. Students will be able to do regression analysis. They will be able to choose a topic conducive to regression analysis, specify a regression equation, enter data into Excel, run descriptive statistics on the data, run regressions in Excel or other statistical programs, interpret and evaluate the results, and write a series of reports detailing the regression project and the results.

2. Students will be able to evaluate regression results, including being able to determine whether the regression coefficients have the expected sign, whether the regression coefficients are statistically significant, whether the equation includes irrelevant variables or omits theoretically relevant variables, and whether the goodness of fit of the equation appears adequate.

3. Students will be able to distinguish between a controlled experiment and an observation study, and explain why regression analysis is needed with an observational study to estimate the impact of one variable on the dependent variable when multiple variables are changing.

4. Students will be able to calculate in Excel and use in real-world applications of the mean, the variance, the covariance, the coefficient of variation, and the correlation coefficient.

5. Students will be able to compare and contrast regression analysis and analysis of variance (ANOVA). Students will be able to distinguish within-sample and between-sample variation in ANOVA, and will be able to interpret ANOVA output.

6. Students will be able to explain the sampling distribution of an estimator, and the properties of unbiasedness and efficiency.

7. Students will be able to do hypothesis testing using either the traditional rejection-region approach or the p-value approach. Students will be able to test a single population mean and will be able to test in Excel two population means.

8. Students will be able to distinguish between quantitative and qualitative variables and will be able to construct and use dummy variables - both intercept dummies and slope dummies.

9. Students will be able to explain multicollinearity and its effect on regression results. Students will be able to choose independent variables that are not redundant and to run using Excel, or other statistical programs, the correlation matrix to calculate pairwise correlations.

10. Students will be able to estimate using Excel a linear probability model, and will be able to interpret the results and use the results for prediction.

11. Students will write and communicate orally using statistics to inform conversation.

Teaching Philosophy

I enjoy teaching and look forward to working with all students. Teaching affords me the opportunity to show students how exciting and useful some subjects can be, and I hope to convey that each class. I understand students have diverse interests and strengths, and so may not share my same enthusiasm for a subject. Nevertheless, my aim is to expand students' knowledge, appreciation, and enjoyment of the subject. At the same time, I believe in a laissez-faire approach to teaching. It is my job to provide the best learning opportunity possible. It is the student's job to make the most of that opportunity. I am committed to helping students who show up and make an effort. For students who do not, I assume they know what is best for them.

I seek to promote active learning as much as possible. I design lectures under the assumption students have completed assigned readings, thus allowing lectures to be more interactive, encouraging questions and critical thinking. I use class time to motivate, clarify, extend, and synthesize the reading material, not repeat it. I also use class time to involve students in the active practice and application of important concepts or skills both individually and collectively. I believe this helps solidify learning, while promoting self-teaching and cooperation with others. Lastly, it is imperative that students possess effective communication skills. Learning is largely wasted if students cannot, in turn, express their knowledge. To the extent that is possible, I will promote the use and development of oral and written communication.

Overall, I want students to have fun and benefit from my class. Each day, I want students to leave more knowledgeable and curious than when they arrived. I hope that formal education is seen as a group process meant to enrich our lives, not define our self-worth. To that end, I aim to foster an environment where students are motivated to engage with the material and each other.

Grading Criteria

Your class grade will be determined by

- Quizzes and Homework

- Group Regression Project

- Three Exams

As assignments, quizzes, and exams are completed, grades will be returned within a reasonable time. Assignment or task grades will be assigned according to the below distribution.

Assigment/Task	Points	Percentage of Grade
Homework & Quizzes	100	20%
Group Regression Project	100	20%
Exam I	100	20%
Exam II	100	20%
Final Exam	100	20%

A total of 500 points is possible. Grades will be determined by the below scale.

Grade	Total Points	Percentage
A	450-500	90-100%
B	400-449	80-89%
C	350-399	70-79%
D	300-349	60-69%
E	< 300	< 60%

Please feel free to consult with me regarding grade uncertainty, but my hope is that the above structure enables you to always know your current grade.

Teaching Methods and Class Components

I will try my best to keep class on schedule and follow a logical, predictable pattern. While my priority is to assign an amount of work necessary to achieve the learning objectives, I am aware you have other commitments. The class components – lectures, homework, quizzes, group project, and exams – are designed to compliment each other and help you maintain a reasonable, evenly distributed time commitment to the class.

Lectures

These will entail a mixture of methods as time allows. Lecture notes will be prepared for each course topic to help me stay organized and provide you reference materials. Slides will not drive lectures, but may be used to visually supplement topics. I will regularly ask you to work together with your classmates, completing practice questions and comparing answers. Additionally, I will set up formal **learning teams**. Learning teams will consist of about four students and will need to sit with each other during class. The learning teams will be announced around the third class period.

Homework & Quizzes

Homework is designed to reinforce the material covered in class and help you prepare for quizzes and exams. I will assign homework consistently throughout the semester. These are not intended to be too difficult or require too much time, but rather, an opportunity to practice that should save you time studying in the long run. Reading the text and/or lecture notes and attending class will minimize difficulty.

Quizzes are designed to reinforce homework and help you prepare for tests but with fewer points at stake. All quizzes will be announced during the previous class period or earlier. They will be at the beginning of class and will be timed. Extra time will not be given for late arrivals so that lecture plans are not disrupted.

Since quizzes and homework total 100 points, I will aim to assign approximately 7 problem sets and 3 quizzes, so that each are worth 10 points. To receive full points on quizzes and homework assignments, please be sure to (1) show your work, (2) follow directions, (3) provide accurate answers, and (4) submit assignments on time.

Exams

There are three exams. The Final Exam is comprehensive, with an emphasis on the material since Exam II. The exams cover material from class, quizzes, homework, and any assigned readings. The course material builds upon itself, so each exam will include concepts from previous exams. I do not plan to implement a curve, but I retain the right to do so if necessary. Bring a calculator to each exam.

Exam Dates:

- Exam I: February 8, 2017

- Exam II: March 10, 2017

- Final Exam: May 4, 2017 at 10:30-12:30 a.m.

Group Regression Project

The projects allow you to do regression analysis in a realistic manner. The reasons for group projects, as opposed to individual projects, are to share the workload, to clarify your understanding of regression analysis through interactions with your group members, and to work together as a team to produce a final product.

Assignment to Groups
I will assign you to a group. The group sizes will be 4 to 5 students. Please let me know within the first week if you have a strong personal conflict with anyone in class and would prefer not to work with them. Additionally, I will assign a student to serve as the group leader. (I will only assign someone who is willing to be a group leader.) The group leader?s role is to keep the group on task, and to divide the work load among the group members.

Project Grades
Your grade on the group project will be the simple average of two grades: your group's grade and your individual-contribution grade, unless you earn less than a B on your individual-contribution grade. If you receive below a B on your individual-contribution grade, then your project grade will only be your individual-contribution grade. For example, if your group's grade is 94% and your individual-contribution grade is 76%, then your individual grade will be 76%, not (94 + 76)/2 = 85%.

Your group's grade depends on how well your group performs the five parts of the project detailed below. Your individual-contribution grade depends on how much you contribute to your group project. To determine your individual contribution, I will observe you throughout the semester, and at the end of the semester I will ask each group member to evaluate each others' contribution. A checklist is provided at the end of the syllabus on what is expected of each group member.

Project Parts & Tentative Dates
A brief description of each part of the project and the points for each is detailed below.

1. **Proposal** (20 points; February 15): Select an interesting problem conducive to regression analysis, appropriate for your assignment (not too little or not too grand), and with data available. Explain your project, define the variables, and denote data sources.

2. **Variable Classification, Regression Specification & Data** (20 points; March 3): Specify the regression equation, classify the independent variables as main, marginal, substitutes, and special interests, and provide hard copies of the data.

3. **Data Analysis** (20 points; March 31): Enter your data into Excel. Calculate, report, and analyze the summary statistics. Analyze the data to check for mistakes and to get a "feel" for your data.

4. **Regression Results** (30 points; April 12): Estimate regressions. Evaluate, report, and interpret the results for each regression specification and thoughtfully develop the "best" regression equation.

5. **Revisions, Extensions, Conclusions, & Further Research** (10 points; April 21): Make needed revisions, consider extensions to the regression equation, interpret your results, and summarize your most interesting findings.

A complete description for each project part will be handed out as we progress through the semester. Each part of the project will be written as a paper and each part builds upon the previous parts. For each deadline, you will attach the due part to prior parts, so that you will be submitting a final paper by the end of the semester. During the last two class periods, each group will give about a ten to fifteen minute presentation of their regression results.

Class Policies and Expectations

Missed Assignments/Tasks

Late homework assignments or make-up quizzes and exams are allowed only in the event of an excused absence. Without an excused absence, a grade of zero will be given for the assignment/task in question. Make-up quizzes and exams will be given soon after the original date and at a common time reasonably convenient to everyone involved.

Attendance and Class Decorum

I do not take attendance. Other than quizzes and exams, your attendance in class will in no way directly affect your grade. That being said, academic performance is highly correlated with class attendance. I take no offense if students decide not to attend class. In return, for students who willingly miss class on a regular basis, I ask that they not seek help during my office hours or by appointment.

Please be respectful to everyone in class. I do not mind students using any materials or equipment in class that best helps them learn and study. If, for whatever reason, you do not think you will be able to stay attentive in class, I would appreciate it if you chose not to attend class. You will not be penalized for doing so. On the other hand, I cannot tolerate students distracting other students.

Excused Absences

The University defines the following as excused absences: serious illness, illness or death of family member; University-related trips; and major religious holidays. In each case, appropriate verification may be required. Students missing assignments due to an excused absence bear the responsibility of informing the instructor about their excused absence within one week following the period

of the excused absence (except where prior notification is required). The student is required to contact the instructor regarding missed assignments and make-up exams.

Grievance Procedure

The University defines the following as excused absences: serious illness, illness or death of family member; University-related trips; and major religious holidays. In each case, appropriate verification may be required. Students missing assignments due to an excused absence bear the responsibility of informing the instructor about their excused absence within one week following the period of the excused absence (except where prior notification is required). The student is required to contact the instructor regarding missed assignments and make-up exams.

Academic Integrity

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see http://www.uky.edu/Faculty/Senate/ for the current set of Senate Rules) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission. When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else?s work (including, but not limited to a published article, a book, a website, a computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is

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done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where, and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain. Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations Due to Disability

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours or after class. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/.

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Course Outline

Spring 2017, MWF 9:00 - 9:50 a.m.
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I Why Regression Analysis?

1. Freedman, David, Robert Pisani, and Roger Purves. "Chapter 1: Controlled Experiments" and "Chapter 2: Observational Studies"

II Review of Probability Distributions, Sampling, and Inference

1. Continuous Probability Distributions: Sections 6.1, 6.2 & 6.3
2. Sampling and Sampling Distributions: Sections 7.1 & 7.2
3. Estimation: Sections 8.1 & 8.2
4. t-Distribution: Section 8.3
5. Hypothesis Testing: Section 9.1 & 9.2
6. Statistical Inference Concerning Two Populations: 10.1 & 10.2

III Regression Analysis

1. Regression Analysis: Chapter 14
2. Inference with Regression Models: Sections 15.1, 15.3 & 15.4
3. Regression Models with Dummy Variables: Chapter 17
4. Regression Models with Nonlinear Relationships: Chapter 16

IV Analysis of Variance (ANOVA)

1. ANOVA: Chapter 13

V Time Series, Forecasting, and Index Numbers (If time permits)

1. Time Series and Forecasting: Chapter 18
2. Returns, Index Numbers, and Inflation: Chapter 19

ECO 391-003
Class Calendar

Date	Topic	Reading	Tasks
Wednesday, January 11, 2017	Syllabus, Review	Why Regression Analysis	HW#1 (Due 1/15)
Friday, January 13, 2017	Continuous Distribution	6.1	
Wednesday, January 18, 2017	Normal Distribution	6.2	
Friday, January 20, 2017	Normal Distribution & Project Intro	6.3	Project Group Assignments
Monday, January 23, 2017	Sampling & Sampling Distributions	7.1 & 7.2	
Wednesday, January 25, 2017	Estimation	8.1 & 8.2	HW#2 (Due 1/30)
Friday, January 27, 2017	The t-Distribution	8.3	
Monday, January 30, 2017	Hypothesis testing	9.1	
Wednesday, February 1, 2017	Hypothesis testing	9.2	Quiz 1; Exam I Study Guide
Friday, February 3, 2017	Statistical Inference	10.1	
Monday, February 6, 2017	Statistical Inference	10.2	
Wednesday, February 8, 2017	Exam I		Exam I
Friday, February 10, 2017	Project Work		HW#3 (Due 2/17)
Monday, February 13, 2017	Regression Analysis	14.1	
Wednesday, February 15, 2017	Regression Analysis	14.2	Project: Proposal
Friday, February 17, 2017	Regression Analysis	14.3 & 14.4	
Monday, February 20, 2017	Inference with Regression Models	15.1	HW#4 (Due 2/24)
Wednesday, February 22, 2017	Inference with Regression Models	15.3	
Friday, February 24, 2017	Inference with Regression Models	15.4	
Monday, February 27, 2017	Project Work	17.1	Quiz 2
Wednesday, March 1, 2017	Regression with Dummy Variables	17.2	
Friday, March 3, 2017	Regression with Dummy Variables		Project: Variable Classification Exam II Study Guide
Monday, March 6, 2017	Regression with Dummy Variables	17.3	
Wednesday, March 8, 2017	Buffer Day; Review		
Friday, March 10, 2017	Exam II		Exam II
Monday, March 20, 2017	Regression with Nonlinear Relationships	16.1	HW#5 (Due 3/24)
Wednesday, March 22, 2017	Regression with Nonlinear Relationships	16.2	

Date	Topic	Sections	Assignment/Due
Friday, March 24, 2017	Project Work		
Monday, March 27, 2017	Analysis of Variance	13.1	HW#6 (Due 4/3)
Wednesday, March 29, 2017	Analysis of Variance	13.2	
Friday, March 31, 2017	Analysis of Variance	13.3 & 13.4	Project: Data Analysis
Monday, April 3, 2017	Time Series	18.1 & 18.2	
Wednesday, April 5, 2017	Time Series	18.3	Quiz 3
Friday, April 7, 2017	Project Work		HW#7 (Due 4/17)
Monday, April 10, 2017	Time Series	18.4	
Wednesday, April 12, 2017	Time Series	18.5	Project: Regression Results
Friday, April 14, 2017	Returns, Index Numbers, and Inflation	19.1 & 19.2	
Monday, April 17, 2017	Returns, Index Numbers, and Inflation	19.3	
Wednesday, April 19, 2017	Project Work		
Friday, April 21, 2017	Project Work		Project: Final Draft Final Exam Study Guide
Monday, April 24, 2017			Project Presentations
Wednesday, April 26, 2017			Project Presentations
Friday, April 28, 2017	Final Review		
Thursday, May 4, 2017			Final Exam

Individual Contribution to Group Regression Project

Using the scale below, individually rate each member of your group project, including you.

1 = Strongly Disagree   2 = Disagree   3 = Agree   4 = Strongly Agree

Name of Member of Group Project					
Attended Group Meetings & Responded to Emails					
Actively Participated in Group Meetings					
Flexible for Times to Meet					
Worked Well with Group Members					
Willing to Accept Work					
Completed Assigned Work on Time					
Proofread & Wrote Portions of Report					
Enthusiastic & Took Initiative					
Added Considerable Value to the Group Project					
Sum of Above					