**The University of Kentucky**
**Department of Economics**
**Economic and Business Statistics (ECO 391)**
**Fall 2019**

## Instructor

Hanson, Ryan
223R Gatton College of Business & Economics
Class Hours: MW 4:30-5:45PM
Classroom: Gatton 291
Office Hours: Th 9:00-11:00AM, 4:00-5:00PM, or by appointment

If you need to contact me, please use my UK email ryan.hanson@uky.edu. Do not contact me through Canvas. I will try my best to respond quickly but please allow me appropriate time.

## Course Description

Statistical ideas are a key part of the language of business and economics. A fundamental understanding of statistics, data interpretation, and empirical analyses will enhance your value when you enter the job market. Additionally, many of the upper level courses in Accounting, Agriculture Economics, Economics, Finance, Management, Marketing, and Public Policy use and build upon the statistical techniques learned in ECO391.

This course provides a toolkit of statistical methods relevant to modern economics and business. A major emphasis is put on data interpretation, estimation, hypothesis testing, correlation, modeling, analysis of variance, regression, and forecasting. A thorough comprehension of each of these topics is vital for understanding the field of business as a whole.

## Course Details

## Prerequisite

STA 296 (Statistical Methods and Motivations) or equivalent

## Required Textbook

Jaggia and Kelly. *Business Statistics: Communicating with Numbers,* 3rd Edition, McGraw-Hill Irwin, 2019. Alternatively, you may use the 2nd edition (2016).

Jaggia and Kelly have written an excellent statistics textbook for business and economics. This text, along with the class preparation assignments, provide a wonderful foundation for our course and will help you master the key concepts of Economic and Business Statistics.

## Intended Student Learning Outcomes

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

1. Students will be able to choose a topic conducive to statistical analysis, specify a regression equation, run descriptive statistics in Excel on the data, run regressions in Excel, interpret and evaluate the results, and write reports detailing the regression project and the results.

2. Students will be able to evaluate regression results, including being able to determine whether the estimated regression coefficients have the expected sign, whether the estimated regression coefficients are statistically significant, whether the equation includes irrelevant variables or omits theoretically relevant variables, whether an alternative functional form should be used, 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 the mean, the variance, the covariance, the coefficient of variation, and the correlation coefficient.

5. Students will be able to explain the meaning of the sampling distribution of an estimator.

6. Students will be able to do hypothesis testing using either the traditional rejection-region approach or the p-value approach.

7. 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.

8. 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 the correlation matrix to calculate pairwise correlations.

9. 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.

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

## Teaching Philosophy and Methods

I love teaching and I look forward to interacting with you throughout the semester about statistical analysis and other concerns you might have. Class time will be a mixture of lecture and active learning in order to involve you in an active discussion of the main principles and ideas. In class, you will **regularly work together with your classmates**. Learning is not just a spectator sport: maximum learning results from maximum involvement.

I will often ask you to compare answers to a problem or work together on a question with your neighbor(s). Additionally, working together in class will serve as a nice break from lecture and will increase the amount of statistics that you learn.

## Grading System

Your grade will be determined by your scores on two midterm exams, your final exam, the average of the top six (out of seven) problem sets, and the average of the top eight (out of ten) in class assignments. The weights of each group are as follows:

| Assignment | Percentage of Final Grade |
|---|---|
| Midterm Exam 1 | 25% |
| Midterm Exam 2 | 25% |
| Final Exam | 25% |
| Problem Sets | 15% |
| In-Class Assignments | 10% |

As we proceed through the semester, feel free to stop by during my office hours if you would like to compute your current grade and/or estimates for what you need to get on an exam in order to achieve a certain course grade.

## Exams

There are three exams each worth 25% of your final grade. The course material builds upon itself, so each exam will include concepts from previous exams. The exams cover material from class, the text, and any additional assigned readings.
- **Exam 1: October 16th at 4:30PM.**
- **Exam 2: November 25th at 4:30PM.**
- **Exam 3: December 20th at 1:00PM.**

**Any student missing an exam due to an excused absence must inform me before the exam.** If you miss an exam and do not receive an excused absence before the exam, your exam grade will be a zero. For those with excused absences, the make-up exam will be given soon after the missed exam at a common time reasonably convenient to all parties.

## In-Class Assignments

While there is no formal attendance policy for this course, in order to ensure that students understand key concepts and prepare for class there will be ten in-class assignments. **The two lowest scores will be dropped.** The top eight grades will then be averaged and used in calculating your final course grade.

Some of these will be short 10-15 minute assignments, like small quizzes, that will ask one or two questions related to the reading, previous lecture notes, or other class-related concerns. These assignments will often be either open note or I will allow you to work in small groups. I will try to emphasize the material that will be on the quizzes ahead of time but may also use these to check your understanding on concepts before deciding to move to the next topic. These assignments may be announced in advance, but will often be unannounced in order to encourage consistent class attendance

Of these in-class assignments, two of them will be larger in-class projects which I will announce ahead of time. You will work together (in class) as a team to do regression analysis, analysis of variance, or another statistical technique. For these projects, I will randomly assign you to a team of 4-5 students. To ensure active participation by all team members, I reserve the right to deduct points on any team member who does not actively participate in the in-class projects. **Since these are larger than the short quizzes, they will count as TWO in-class assignments each for grading purposes.**

## Problem Sets

There will be (at most) seven problem sets throughout the semester. For most assignments, I will upload the questions at least a week in advance in order to give you ample time to work on them. If you have any questions while doing your homework, feel free to send me an email, stop by my office hours, or use the LEAP tutoring resources.

Each problem set will be worth 10 points. **Up to 7 points will be given for completion and effort. For the remaining points, I will randomly choose one question from each problem set to grade for accuracy.** Since I will not be grading the entire problem set, it is important that you go over the answer keys on your own and compare it with your own answers.

Problem Sets will be collected at the beginning of class on the day they are due. Due dates will be announced repeatedly in class and will be on the problem set itself. I will accept assignments up to 24 hours late at a 30% penalty. After 24 hours, I will upload the answer key and anyone who has not turned in an assignment will get a zero. Furthermore, at the end of the semester, **I will drop your one lowest homework grade**.

## Being Courteous

Be on time and if possible do not leave until class is dismissed. Late arrivals and early departures disrupt your fellow students and me. If nature calls so loudly that you must answer, please leave and return to the classroom quietly.

Do not carry on private conversations during class. This behavior shows disrespect for your classmates who would like to hear the lecture and it can have a negative impact on the learning experience of the entire class. With such a small class size, it will be very apparent when students are distracted.

## Cell Phones and Laptops

I expect professional behavior. Silence your cell phones. No texting during class. You can use your laptop to take notes or to follow along with coding demonstrations. You cannot use your laptop for instant messaging, e-mailing, playing games, checking sports scores, shopping, and the like during class.

## Excused Absences

The University Senate Rule on Excused Absences states that a student is entitled to an excused absence for the following reasons: 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 me about their excused absence within three days following the period of the excused absence (except where prior notification is required). **I will regularly confirm the authenticity of documentation used to verify excused absences.**

## LEAP Tutoring

The Gatton College of Business and Statistics offers free tutoring for ECO 391. Tutor are there to facilitate student learning, not to complete assignments for students or substitute for attending class. The tutors will expect that students have already made a sincere attempt at the assignments/questions, studied the course materials, and attended class. **Tutoring for ECO 391 is M-Th, 12:00-4:00PM in Gatton 251 and 253.**

## Title IV Policy

In order to meet federal regulations, the instructor will monitor student participation in this class through attendance or assignments. The instructor will assess student engagement at least once during the first three weeks of the semester/session using an instrument or activity. **Students whose engagement cannot be determined on that day may be dropped from the course**. If you will be missing any class period or will not be submitting an assignment during that period, it is your responsibility to notify the instructor, regardless if the absence or missed assignment is excused or not under University rules.

## Grievance Procedure

Anyone feeling that a dispute exists after the grading of an exam may submit a written grievance. The grievance should identity the item in dispute and provide arguments supporting the student's position. Grievances must be **submitted within two class periods following the return of the exam/assignments**.

## Cheating

Academic integrity is valued by the University of Kentucky and its vast majority of students. University policy will be followed for any student caught cheating or plagiarizing and the penalty could include an E in the course and possible suspension or dismissal from UK.

## Students with Disabilities or Accommodation Requests

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) <u>at least one week before the first exam</u>. 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/

## Service Animals

Only service animals and service animals in training as dictated under the Americans with Disabilities Act (ADA) are allowed in academic buildings. All other animals, including support animals, are not permitted in the Gatton College. Please direct all questions to David Beach, Director of the UK Service Animal program, in the Disability Resource Center at dtbeac1@uky.edu.

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## Course Outline

**I. Brief Review of Basic Statistical Ideas**
>  (a) Ch.3, "Numerical Descriptive Measures," Sections 3.1, 3.4, & 3.8.
>  (b) Ch.6, "Normal distribution: Continuous Probability Distributions," Section 6.2.
>  (c) Ch.8, "T-Distribution: Interval Estimation," Section 8.2.

**II. Statistical Inference**
>  (a) Ch.7, "Sampling and Sampling Distributions," Sections 7.1-7.2.
>  (b) Ch.8, "Interval Estimation," Sections 8.1-8.2.
>  (c) Ch.9, "Hypothesis Testing," Sections 9.1-9.3.
>  (d) Ch.10, "Statistical Inference Concerning Two Populations," Sections 10.1 and 10.2.

**III. Regression Analysis**
      (a) Ch.14, "Regression Analysis".
      (b) Ch.15, "Inference with Regression Models," Sections 15.1, 15.3.
      (c) Ch.17, "Regression Models with Dummy Variables".
      (d) Ch.16, "Regression Models with Nonlinear Relationships," Sections 16.1 &
            Portions of 16.2.

**IV. Additional Regression Topics**
      (a) "Model Assumptions and Common Violations" Section 15.4
      (b) Empirical Case Studies