

**AG 597 – STATISTICAL METHODS IN AGRICULTURE**  
**Texas A&M University-Commerce**  
**School of Agriculture**  
**Spring 2015**

**Instructor:** Dr. Jose Lopez

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**Class Time:** MW 10:00 - 11:15 a.m., SOUTHED Room 109

**Office Hours:** For immediate consultation I will be available Mondays and Wednesdays from 10:30 a.m. - 11:30 p.m., and Tuesdays and Thursdays from 2:00 p.m. – 5:00 p.m. or by appointment. You are also welcome to stop by my office at any other time. If I am unable to meet with you at that time, we will schedule an appointment. The best way to contact me is via email at [Jose.Lopez@tamuc.edu](mailto:Jose.Lopez@tamuc.edu). You can also email me from eCollege (<http://www.online.tamuc.org/>).

**Required Text:** None.

**Prerequisites:** None.

**Teaching Philosophy:**

1. A course must deliver information, concepts and methods that will be useful in the student's professional life. However, learning analytical reasoning skills and improving the ability to process and use information efficiently is more important than memorizing facts and formulas and performing procedures repeatedly.
2. Students learn best when theories, concepts and procedures are explained in plain language as well as formally, and are complemented with examples or applications that are relevant to the students.

**Character Formation:** It is important during your graduate education to learn the values and rewards of hard work, responsibility, and honesty. The professor will promote character formation while teaching the course.

**Course Description:**

**Student Learning Outcomes:** Upon satisfactory completion of the course the students will be able to:

- To compute measures of central tendency and dispersion, and use them to analyze and summarize datasets.
- To compute and measure the correlation between two agricultural variables and explain the difference between correlation and causation.
- To understand different probability distributions.
- To understand and be able to compute confidence intervals.
- To conduct hypothesis tests.

- To determine null and alternative hypotheses, explain Type I and Type II errors, and state conclusions to hypothesis tests for population mean with known or unknown population standard deviation and for a population proportion.
- To be able to compare means from different samples.
- To understand the fundamental concepts and procedures of multiple regression, econometric analysis
- To learn how to build and use econometric models for applied agricultural economic analysis

## **Topics:**

### Part I: Descriptive Statistics

- Numerically Summarizing Data
  - Measures of Central Tendency
    - Discussion, computation, and interpretation of measures of central tendency (mean, media, and mode) and the relationships between them; explanation of resistance.
  - Measures of Dispersion
    - Discussion, computation, and interpretation of measures of dispersion (range, variance, and standard deviation) and the relationships between them; use of the empirical rule to describe data that are bell shaped (percent of observations lying within one two, and three standard deviation from the mean).
  - Measures of Position and Outliers
    - Explanation of measures of positions (the z-score, the percentile, the interquartile, the interquartile range, and outliers); computation and interpretation z-scores, percentiles, quartiles, and interquartile range; checks for outliers.
- Describing the Relation between Two Variables
  - Pearson product moment correlation coefficient
    - Properties, computation, and interpretation of the linear correlation coefficient; discussion of confounding and lurking variables.

### Part II: Probability Distributions

- Normal distribution
- Standard Normal Distribution
- Chi-Square Distribution
- The F-Distribution

### Part III: Inference

- Confidence Intervals
  - Constructing confidence intervals for a population mean when the standard deviation is known
  - Confidence intervals for a population mean when the population standard deviation is unknown
  - Constructing confidence intervals for estimators from simple random samples
- Hypothesis Tests Regarding a Parameter
  - The Language of Hypothesis Testing

- Determination of the null and alternative hypothesis; explanation of Type I and Type II errors; and stating conclusions to hypothesis testing.
- Hypothesis Tests for a Population Mean – Population Standard Deviation Known
  - Hypothesis testing about a population mean with standard deviation known using the classical approach, using P-values, and using confidence intervals with small and large samples; consideration one and two tail tests; discussion of statistical significance and practical significance.
- Hypothesis Tests for a Population Mean – Population Standard Deviation unknown
  - Hypothesis testing about a population mean with standard deviation unknown using the classical approach, using P-values, and using confidence intervals with small and large samples; consideration of one and two tail tests.
- Hypothesis Tests for a Population Proportion
  - Hypothesis testing about a population proportion with small and large samples; consideration of one and two tail tests.
- Inference on Two Samples
  - Inference about two means: dependent samples
  - Inference about two means: independent samples
  - Inference about population proportions
  - Inference for two population standard deviations
- Inference on Categorical data
  - Goodness-of-Fit Test
    - Chi-square distribution
    - Expected counts
  - Test for independence and the Homogeneity of Proportions
- Comparing three or more means
  - One-way analysis of variance
    - Requirements to perform a one-way ANOVA
    - Test a hypothesis regarding three or more means using one-way ANOVA
      - ANOVA F-Test Statistic
  - Tukey Test
  - The randomized complete block design
  - Two-way analysis of variance

#### Part IV: Regression Analysis

- The Simple Regression Model
  - Specification (the true regression line, the estimated regression line)
  - Assumptions
  - Estimation of the model coefficients (ordinary least squares)
  - Interpretation of the regression model
  - Measures of goodness of fit
  - Properties of the OLS estimators
- The Multiple Regression Model
  - The model
  - Model estimation
  - Interpretation of the coefficients

- The Model's goodness of fit
- Sampling Theory in Regression Analysis
  - *t* tests
  - Analysis of variance in a regression model
  - F test
- Applications of the simple and multiple regression models
  - Lagged variables
  - First difference of a variable
  - The polynomial specification
  - The reciprocal specification
  - The log-linear specification
  - Use of dummy variables

**Grading:**

Exam 1	25%
Exam 2	25%
Exam 3	25%
Quizzes and/or homework	25%
	100%

**Grading Scale:**

<u>Range</u>	<u>Grade</u>
90-100.00	A
80-89.99	B
70-79.99	C
60-69.99	D
Less than 60	F

**Exams:** No makeup exams will be offered. A grade of zero will be assigned to any missed exams. Make sure you arrive in time.

**Quizzes:** Quizzes will be graded and discussed in class. Quizzes should be considered very important material for exams. Quizzes will be either pop-quizzes or announced in class.

**Class Participation:** Students should come to class prepared by reading and completing course assignments prior to class. It is the students' responsibility to be familiar with and understand all previously covered material prior to each new lecture.

**Students with Disabilities:** The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact:

**Office of Student Disability Resources and Services**  
**Texas A&M University-Commerce**  
**Gee Library**  
**Room 132**  
**Phone (903) 886-5150 or (903) 886-5835**  
**Fax (903) 468-8148**  
[StudentDisabilityServices@tamuc.edu](mailto:StudentDisabilityServices@tamuc.edu)

**Counseling Center:** A student that faces a crisis or a serious and unforeseeable event that affects his/her class performance must contact the Counseling Center, Student Services Building, Room 204, Phone (903) 886-5145. If important class material or course assignments are missed because of such crisis or event, the student must contact the instructor as soon as possible.

**General Policies for Classes:** All students enrolled at the University will follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. See Student's Guide Handbook, Rules and Procedures, Code of Student Conduct (<http://www.tamuc.edu/CampusLife/documents/studentGuidebook.pdf>).

**Academic Integrity:** Students must follow the *Code of Student Conduct* in the *Student Guidebook* (<http://web.tamuc.edu/admissions/studentGuidebook.aspx>). Any form of plagiarism or academic dishonesty will not be tolerated. Academic honesty is defined on *Chapter 13 Students (Academic)* of the *TAMUC Rules and Procedures* (<http://web.tamuc.edu/aboutus/policiesproceduresstandardsstatements/rulesprocedures/>):

“Academic dishonesty” includes, but is not limited to, plagiarism (the appropriation or stealing of the ideas or words of another and passing them off as one’s own), cheating, collusion (the unauthorized collaboration with others), and abuse (destruction, defacing, or removal) of resource material.

**Course Design:** A tentative class schedule of the material that will be covered each day is provided at the end of this syllabus. Tentative exam dates are also provided. The official exam dates will be announced in class. Quizzes will be either pop-quizzes or announced in class.

**eCollege:** This course will be enhanced using eCollege. Students are required to download PowerPoint presentations and other important class material from the eCollege website for the course (<http://www.online.tamuc.org/>). You will need your CWID and password to log in to the course. Make sure you visit this website when preparing for class.

If you do not know your CWID or have forgotten your password, contact Technology Services at 903.468.6000 or [helpdesk@online.tamuc.org](mailto:helpdesk@online.tamuc.org)

**Technology Requirements:** The following information has been provided to assist you in preparing to use technology successfully in this course.

- Internet access/connection – high speed recommended (not dial-up)
- Word and Spreadsheet Processor (i.e. MS Word or Word Perfect and MS Excel or a spreadsheet processor)

Additionally, the following hardware and software are necessary to use eCollege:

Our campus is optimized to work in a Microsoft Windows environment. This means our courses work best if you are using a Windows operating system (XP or newer) and a recent version of Microsoft Internet Explorer (6.0, 7.0, or 8.0).

Your courses will also work with Macintosh OS X along with a recent version of Safari 2.0 or better. Along with Internet Explorer and Safari, eCollege also supports the Firefox browser (3.0) on both Windows and Mac operating systems.

It is strongly recommended that you perform a “Browser Test” prior to the start of your course. To launch a browser test, login in to eCollege, click on the ‘myCourses’ tab, and then select the “Browser Test” link under Support Services.

**Important Dates:**

January 19, Monday	Martin Luther King Jr. Day (No Class)
January 20, Tuesday	First day of classes.
February 5, Thursday	Last day to drop a 16 week course with 100% refund and no grade.
March 16 – March 20	Spring Break (No Class)
May 8 <sup>th</sup> , Friday	Last day of classes.
May 9 – May 15	Week of final exams.

*The instructor reserves the right to make modifications to this syllabus during the semester.*