Economics 339.002
Applied Statistics
TR 11:00-12:15 PM
369 McGee Building
Spring 2018

The prerequisite for enrollment in ECO 339 is MTH 220.

Economics 339 is about the application of statistical data analysis. Models, their assumptions, and applications are discussed at length. Students learn in this course how to use statistical and logical approaches in order to acquire the understanding necessary to make decisions in the face of uncertainty. Students successfully completing this course should be able to:

1. Use quantitative, abstract, and logical reasoning
2. Understand the theory of empirical hypothesis testing
3. Acquire skills in the use of categorical Chi-square tests, t-tests, F-tests, and various non-parametrics.
4. Utilize analytical thinking, critical analysis, logic, creativity, and integrative problem solving in the context of safety management and of quality control for an ongoing process.
5. Understand sampling error.
6. Understand what makes a test more and less powerful.
7. Compute and interpret simple- and multiple-regression equations using raw data
8. Understand the concept of employing block designs.
9. Understand the theory of hypothesis testing in its connections to simple- and multiple-regression, One-way and Two-way Analysis of Variance, and associated non-parametric tests.

Your course grade is determined by my evaluation of your performance on three Mid-term examinations, a comprehensive final examination, and in-class exercises. Eighty percent of your grade is based upon performance on examinations and twenty percent of your grade is determined by your performance on in-class exercises.

Midterm Examination I is to be given on Tuesday, February 6 during class.
Midterm Examination II is to be given on Tuesday, March 6 during class.
Midterm Examination III is to be given during class on Thursday, April 5 during class.
Final Examination is to be given per the University Final Exam Schedule on Tuesday, May 8 at 10:30 AM.
<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter Description</th>
<th>Lecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 16</td>
<td>No reading assignment discussed today</td>
<td>Sample mean, sample variance, two-way contingency table analysis, probability definition</td>
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<tr>
<td>January 18</td>
<td>Chapter 10: hypothesis tests involving a sample mean or proportion</td>
<td>Marginal, joint and conditional probabilities as they relate to a contingency table analysis</td>
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<tr>
<td>January 23</td>
<td>Chapter 10: hypothesis tests involving a sample mean or proportion</td>
<td>The notion of conditional mean value as it relates to a contingency table. The problem of reconciling belief and fact using hypothesis testing. Falsification vs. verification Type I error, Type II error and how these concepts relate to sampling error. The p-value of a hypothesis test.</td>
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<tr>
<td>January 25</td>
<td>Chapter 14: Nonparametric methods</td>
<td>Wilcoxon Signed Rank Tests</td>
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<tr>
<td>January 30</td>
<td>Chapter 10: hypothesis tests involving a sample mean or proportion</td>
<td>Type I and Type II error in a safety problem and in a quality control problem</td>
</tr>
<tr>
<td>February 1</td>
<td>Chapter 19: Decision Theory</td>
<td>Bayes Theorem applications</td>
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<tr>
<td>February 6</td>
<td>Examination I</td>
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<tr>
<td>February 8</td>
<td>Chapter 11: hypothesis tests involving a sample mean or proportion</td>
<td>Paired t-tests and tests for differences in proportion</td>
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<tr>
<td>February 13</td>
<td>Chapter 14: Nonparametric methods</td>
<td>Wilcoxon Signed Rank Tests for paired samples. The notion of the power of a test.</td>
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<tr>
<td>February 15</td>
<td>Chapter 11: hypothesis tests involving two sample means or proportions</td>
<td>z-tests and t-tests for comparing the results of two independent samples</td>
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<tr>
<td>February 20</td>
<td>Chapter 11: hypothesis tests involving two sample means or proportions</td>
<td>z-tests and t-tests for comparing the results of two independent samples</td>
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<tr>
<td>February 22</td>
<td>Chapter 11: hypothesis tests involving two sample means or proportions</td>
<td>z-tests and t-tests for comparing the results of two independent samples</td>
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<tr>
<td>February 27</td>
<td>Chapter 12: Analysis of Variance tests</td>
<td>The notation of ANOVA and One-way ANOVA</td>
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<tr>
<td>March 1</td>
<td>Chapter 12: Analysis of Variance</td>
<td>The notation of ANOVA and the</td>
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<tr>
<td>Date</td>
<td>Chapter Description</td>
<td>Lecture</td>
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<tr>
<td>March 6</td>
<td>Examination II</td>
<td>Lecture</td>
</tr>
<tr>
<td>March 8</td>
<td>Chapter 14: Nonparametric methods</td>
<td>The Friedman and the Kruskal Wallis Tests. The notion of the power of a test.</td>
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<tr>
<td>March 13</td>
<td>Spring Break</td>
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<td>March 15</td>
<td>Spring Break</td>
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<tr>
<td>March 20</td>
<td>Chapter 12: Analysis of Variance</td>
<td>Two-way ANOVA</td>
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<td>March 22</td>
<td>Chapter 12: Analysis of Variance</td>
<td>Two-way ANOVA</td>
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<tr>
<td>March 27</td>
<td>Chapter 7: Continuous Probability Distributions</td>
<td>The Poisson Distribution</td>
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<td>March 29</td>
<td>Easter Break</td>
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<td>April 3</td>
<td>Chapter 13: Chi-Square Applications</td>
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<tr>
<td>April 5</td>
<td>Examination III</td>
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<tr>
<td>April 10</td>
<td>Chapter 13: Chi-Square Applications</td>
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<tr>
<td>April 12</td>
<td>The Algebra and the Geometry of Simple and Multiple Regression</td>
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<td>April 17</td>
<td>Chapter 15: Simple Linear Regression and Correlation</td>
<td>The Notion of Correlation Cause &amp; Effect</td>
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<td>April 19</td>
<td>Chapter 15: Simple Linear Regression and Correlation</td>
<td>Concomitant variation and parameter estimates of a simple linear model</td>
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<tr>
<td>April 24</td>
<td>Chapter 15: Simple Linear Regression and Correlation</td>
<td>The case of predicting ice cream sales at Minute Maid Park</td>
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<tr>
<td>April 26</td>
<td>Chapter 16: Multiple Regression and Correlation</td>
<td>The case of predicting ice cream sales at Minute Maid Park</td>
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<td>May 1</td>
<td>Chapter 16: Multiple Regression and Correlation</td>
<td>The case of predicting ice cream sales at Minute Maid Park</td>
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<tr>
<td>May 3</td>
<td>Chapter 16: Multiple Regression and Correlation</td>
<td>Dummy variables and multicollinearity</td>
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<tr>
<td>Tuesday, May 8 at 10:30 AM</td>
<td>Final Examination</td>
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Textbook Problem Assignments for Economics 339
(Reference Weirs Text)

I will not collect these assignments listed below for grading; however, these assignments will prove useful in your education. Moreover, I will use these problems listed below (along with lecture notes and chapter reading assignments) as inspiration for problems that I will ask on your Mid-term and Final Examinations.

Errors I and II
p-value
H Test one tail
H Test one tail
H Test two tail
H Test one tail
t-test 2 ind samples
t-test 2 ind samples
t-test differences
Proportions
Anova
Anova
Chi-sq
Chi-sq
Wilcoxon
Wilcoxon
Kruskal-Wallis
Friedman
Linear regression model parameter estimates
Linear regression model correlation and Rsq
Linear regression model significance
Multiple regression model estimation
Multiple regression model param. estimates
Multiple regression model
Fitting a second order polynomial model
Polynomial model with two predictors
Log transformation
Multicollinearity

10.6 page 316
10.29 page 329
10.42 page 336
10.51 page 337
10.64 page 344
10.74 page 345
11.4 page 373
11.5 page 373
11.47 page 390
11.54 page 395
12.29 page 428
12.52 page 440
12.77 page 456
13.22 page 479
13.39 page 485
14.7 page 511
14.14 page 516
14.23 page 521
14.38 page 530
15.10 page 560
15.37 page 571
15.51 page 577
16.9 page 608
16.12 page 608
16.38 page 631
17.6 page 652
17.16 page 658
17.32 page 667
17.41 page 669

Do not use data file
Do not use data file
Do not use data file

Course Policies for Eco 339

Missed Examinations: Make-up exams will be given only in unusual circumstances. Make up exams will be given for documented medical reasons as defined in writing by an attending physician or for pressing family matters, such as the death of a near relative, or for university sponsored travel. Written documentation will be required in all cases. Students may apply for a make-up exam by writing me a typewritten letter explaining extenuating circumstances which justify the giving of a make-up exam. This make-up exam is comprehensive and is given at the end of the semester. Accompanying the application letter for a make-up should be the required written documentation.

Attendance: You are required to attend class and to be on time for the classes that you attend.
Program Learning Outcomes: Program learning outcomes define the knowledge, skills, and abilities students are expected to demonstrate upon completion of an academic program. These learning outcomes are regularly assessed to determine student learning and to evaluate overall program effectiveness. You may access the program learning outcomes for your major and particular courses at http://cobweb.sfasu.edu/plo.html.

Student Academic Dishonesty (University Policy 4.1)
Abiding by university policy on academic integrity is a responsibility of all university faculty and students.

Definition of Academic Dishonesty Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to (1) using or attempting to use unauthorized materials on any assignment or exam; (2) falsifying or inventing of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were one’s own. Examples of plagiarism include, but are not limited to (1) submitting an assignment as if it were one’s own work when is at least partly the work of another person; (2) submitting a work that has been purchased or otherwise obtained from the Internet or another source; and/or (3) incorporating the words or ideas of an author into one’s paper without giving the author credit. Penalties may include, but are not limited to reprimand, no credit for the assignment or exam, re-submission of the work, make-up exam, failure of the course, or expulsion from the university. Please read the complete policy at http://www.sfasu.edu/policies/student_academic_dishonesty.pdf.

Course Grades (University Policy 5.5)
At the discretion of the instructor of record and with the approval of the academic unit head, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F, except as allowed through policy related to active military service. If students register for the same course in future semesters, the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. Please refer to the complete policy at http://www.sfasu.edu/policies/course-grades.pdf.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Room 325 in the Human Services Building, 468-3004/468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Student Conduct (University Policy 10.4)
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the full Student Conduct Code at http://www.sfasu.edu/policies/student-conduct-code.pdf.) Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic, or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/ inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the iCare Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.