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ECO 578 - 81E, Statistical Methods
Fall, 2015

Instructor: Dr. Ed Manton, VME Regents Professor
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Office: BA 202
Office Hours: S 9:30 – 10:15 am (at the UCD prior to class)

COURSE INFORMATION

Required Text: Business Statistics, In Practice Bruce L. Bowerman, Richard T. O'Connell, Emily S. Murphree, McGraw-Hill Irwin, 7th edition, ISBN- 978-0-07-352149-7.

Course Description: A course dealing with statistical concepts including measures of central tendency and dispersion, probability distributions, the Central Limit Theorem, sampling, estimation, hypothesis testing, analysis of variance, correlation and regression analysis, multiple regression and statistical modeling.

 STUDENT LEARNING OUTCOMES:

Criteria (Course Objectives)	1 (Unsatisfactory)	2 (Emerging)	3 (Proficient)	4 (Exemplary)
1) Learn how to calculate and apply measures of location and measures of dispersion -- grouped and ungrouped data cases.	Student cannot and apply any measures of location and measures of dispersion for grouped and ungrouped data.	Student can apply some measures of location and measures of dispersion for grouped and ungrouped data.	Student can apply most measures of location and measures of dispersion for grouped and ungrouped data.	Student can apply all measures of location and measures of dispersion for grouped and ungrouped data.
2) Learn how to apply discrete and continuous probability distributions to various business problems.	Student cannot apply discrete and continuous probability distributions to any business problems.	Student can apply discrete and continuous probability distributions to some business problems.	Student can apply discrete and continuous probability distributions to most of business problems.	Student can apply discrete and continuous probability distributions to all of business problems.

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3)Understand the hypothesis testing: 3.1 Be able to perform Test of Hypothesis	3.1 Student cannot perform the test of hypothesis	3.1 Student can perform some test of hypothesis	3.1 Student can perform most test of Hypothesis	3.1 Student can perform all test of Hypothesis
3.2 calculate confidence interval for a population parameter for single sample and two sample cases.	3.2 Student cannot calculate confidence interval for a population parameter for single sample and two sample cases.	3.2 Student can calculate some confidence interval for a population parameter for single sample and two sample cases.	3.2 Student can calculate most confidence interval for a population parameter for single sample and two sample cases.	3.2 Student can calculate all confidence interval for a population parameter for single sample and two sample cases.
3.3 Understand the concept of p-values.	3.3 Student doesn't understand the concept of p-value.	3.3 Student understands some part of the concept of p-value.	3.3 Student understands most part of the concept of p-values.	3.3 Student understands the entire concept of p-values.
4) Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.	4) Student doesn't know non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.	4) Student knows some parts of non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.	4) Student knows most parts of non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.	4) Student knows all parts of non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.
5) Understand regression analysis: 5.1 Be able to compute and interpret the results of Bivariate Regression	5.1 Student cannot compute and interpret the results of Bivariate Regression	5.1 Student can compute and interpret some of the results of Bivariate Regression	5.1 Student can compute and interpret most of the results of Bivariate Regression	5.1 Student can compute and interpret all of the results of Bivariate Regression

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5.2 Be able to compute and interpret the results of Multivariate Regression.	5.2 Student cannot compute and interpret the results of Multivariate Regression	5.2 Student can compute and interpret some of results of Multivariate Regression	5.2 Student can compute and interpret most of results of Multivariate Regression	5.2 Student can compute and interpret all of results of Multivariate Regression
5.3 Be able to compute and interpret Correlation Analysis	5.3 Student cannot compute and interpret Correlation Analysis	5.3 Student can compute and interpret some parts of Correlation Analysis	5.3 Student can compute and interpret most parts of Correlation Analysis	5.3 Student can compute and interpret all parts of Correlation Analysis
5.4 Be able to perform ANOVA and F-test.	5.4 Student cannot solve any questions regarding ANOVA and F-test.	5.4 Student can solve easy questions regarding ANOVA and F-test.	5.4 Student can solve medium-hard questions regarding ANOVA and F-test.	5.4 Student can solve difficult questions regarding ANOVA and F-test.
5.5 Be able to understand both the meaning and applicability of a dummy variable.	5.5 Student cannot apply the dummy variable to solve any questions.	5.5 Student cannot apply the dummy variable to solve some questions.	5.5 Student cannot apply the dummy variable to solve most questions.	5.5 Student cannot apply the dummy variable to solve all the questions.
5.6 Be able to understand the assumptions which underline a regression model.	5.6 Student doesn't understand the assumptions which underline a regression model.	5.6 Student understands some parts of the assumptions which underline a regression model.	5.6 Student understands most parts of the assumptions which underline a regression model.	5.6 Student understands all parts of the assumptions which underline a regression model.
5.7 Be able to perform a multiple regression using computer software.	5.7 Student is unable to perform a multiple regression using computer software.	5.7 Student is able to perform a multiple regression using computer software for easy questions	5.7 Student is able to perform a multiple regression using computer software for medium-hard questions	5.7 Student is able to perform a multiple regression using computer software for difficult questions

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Statement of Ethical and Professional Conduct:

The College of Business and Entrepreneurship at Texas A&M University – Commerce faculty, staff and students will follow the highest level of ethical and professional behavior. We will strive to be recognized as a community with legal, ethical and moral principles and to teach and practice professionalism in all that we do. In an academic environment we will endeavor to not only teach these values, but also to live them in our lives and daily work. Faculty and staff will be held to the same standards and expectations as our students.

Failure to abide by these principles will result in sanctions up to and including dismissal.

Actionable Conduct:

These are five different types of actions that will bring sanction. They are:

1.   Illegal activity: Violation of any local, state or federal laws that prohibit the offender from performance of his or her duty.

2.   Dishonest conduct: Seeking or obtaining unfair advantage by stealing or receiving copies of tests or intentionally preventing others from completing their work. In addition falsifying of records to enter or complete a program will also be considered dishonest conduct.

3.   Cheating: The unauthorized use of another's work and reporting it as your own

4.   Plagiarism: Using someone else's ideas and not giving proper credit.

5.   Collusion: Acting with others to perpetrate any of the above actions regardless of personal gain.

Sanctions:

In the case of staff or faculty the immediate supervisor will be the arbiter of actionable behavior and will use Texas A&M University - Commerce and/or Texas A&M University System Policy and Procedures as appropriate to guide sanctions.

Faculty, guided by clearly delineated policy in the course syllabus, will be arbiter for in-class violations. All violations will be reported to the Dean of the College of Business and Technology to assure equity and to provide appropriate counsel. In addition, the Dean will maintain the records of violations by students. Second violations will be reviewed by the Dean and sanctions beyond those of the faculty up to and including suspension and permanent expulsion from Texas A&M University – Commerce will be considered. Faculty and students are guided by the current undergraduate and graduate catalogs of the university as well as The Students Guidebook. Faculty, staff and students will always be afforded due process and review as appropriate.

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Grading Policy:

Evaluation of student performance will be based primarily upon two equally weighted exams (45% each). The remaining 10% will be awarded for the ASSIGNED PROBLEMS. Grades for the course will be determined by achieving the following average ranges:

Average Range	Grade
90-100	A
80-89	B
70-79	C
60-69	D
Below 60	F

Special Accommodations:

<u>Students with Disabilities:</u>

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

Email: StudentDisabilityServices@tamuc.edu

Website: Office of Student Disability Resources and Services
http://www.tamuc.edu/campusLife/campusServices/studentDisabilityResourcesAndServices/

Nondiscrimination Notice
Texas A&M University-Commerce will comply in the classroom, and in online courses, with all federal and state laws prohibiting discrimination and related retaliation on the basis of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Further, an environment free

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from discrimination on the basis of sexual orientation, gender identity, or gender expression will be maintained.

NOTE THE FOLLOWING

1.   The assignments listed are tentative for the semester. It is meant to be a guide. Certain topics may be stressed more or less than indicated in the text and depending on class progress certain topics may be omitted.

2.   Homework: problems have been **RECOMMENDED** to work on your own for practice and to support your understanding of chapter material. They are not to be turned in. Additional recommended problems may be identified as the class progresses. Solutions may be viewed on the syllabus link "Solutions to Problems" or on the applicable chapter link.

3.   power point slides and solutions to problems are available online both through the syllabus links and the chapter links.

4.   **TEN ASSIGNED PROBLEMS**: 10 Homework Problems will be assigned to be turned in. They will be issued as class handouts. These problems will constitute 10% of the course grade. Most problems will require manual, excel and mega stat solutions.

5.   The midterm exam date indicated on the course syllabus – Oct. 17 - is approximate. You will be informed, at least one week before the exam.

6.   Missed examination: Inform instructor if midterm or final exam are to be missed.

7.   Students are expected to:

     a. Read text assignments as scheduled.

     b. Work the RECOMMENDED problems prior to class (Note: Solutions to problems may be found in the "Solution to Problems" and applicable chapter links and solutions to odd problems may be found in the back of text).

8.   Classroom Demeanor: "All students enrolled at the university shall follow tenets of common decency and acceptable behavior conducive to a positive learning environment". See Students Guide Book.

9.   Attendance Policy: You are expected to be present for all class meetings of this course. You will be allowed to make up work for classes you miss only if your absence is excusable. Excusable absences are defined in the current University Catalog.

Schedule of Assignments:

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The schedule will depend on class progress; chapter assignments and exams dates may be altered as the class progresses. Students should read chapters and do as many of the RECOMMENDED homework problems as possible and be familiar with the chapter summaries and key terms. Note: the dates indicated are "week of". You are expected to read the assigned chapters and attempt the RECOMMENDED problems during the week. ASSIGNED PROBLEMS AND DUE DATES ARE INDICATED BY DATE IN BOLD PRINT. The class meets on the Saturday of the "week of" indicated. These dates are indicated in parentheses.

UNIT 1

(Chapters 1- 8)

Text Assignment	Recommended Homework Problems	Week of (Class Date)	Chapter Goals
Chapter 1 An Introduction to Business Statistics	**1:** 1, 2, 3, 4, 5, 15, 16, 17, 18	31 Aug (Class meets on Sept 5)	1. Define inferential and descriptive statistics. 2. Differentiate between a quantitative and a qualitative variable. 3. Differentiate between a discrete and a continuous variable. 4. Define the 4 levels of measurement – nominal, ordinal, interval and ratio.
Chapter 2 Descriptive Statistics, Tabular and Graphical Methods	**2**: 1, 2, 17, 34	31 Aug (Sept 5)	1. Construct a frequency distribution. 2. Determine the relative and cumulative frequency distributions. 3. Construct a histogram, a frequency polygon, and an ogive.
Chapter 3 Descriptive Statistics Numerical Measures	**3**: 2, 3. 8, 16, 17, 18, 19, 20, 21, 22, 23, 24, 27, 30, 31	31 Aug & 7 Sept (Sept 5 and 12)	1.Define and calculate the mean, mode, median, variance and standard deviation

			.2. Define and calculate measures of skewness and relative variation..
Chapter 4 Probability	4: 2, 3, 8, 9, 11, 18, 19, 20, 21, 24, 25, 27, 76	7 Sept (Sept 12)	1. Define probability. 2. Discuss the types of probabilities – classical, relative frequency, judgment. 3. Define and calculate marginal, joint and conditional probabilities.
Chapter 5 Discrete Random Variables	**5:** 1, 2, 3, 9, 13, 23, 24, 25, 26, 28, 29, 31, 34, 35, 52, 53, 54, 55 **Hand in Assigned Problem # 1 in class on Sept 19 include manual, excel and mega stat solutions.**	7 Sept & 14 Sept (12 and 19 Sept)	1. Define probability distribution and random variable. . . 2.Calculate the mean, variance, and standard deviation of a discrete distribution. 3. Describe the characteristics of the binomial and Poisson distributions. Calculate probabilities using their respective formulas and tables. 4. Calculate the mean, variance and standard deviation for the binomial and Poisson distributions.
Chapter 6 Continuous Random Variables	**6**: 1, 16, 17, 18, 19, 23, 24, 26, 28, 29, 30, 31, 34, 40, 67, 71	21 Sept (26 Sept)	1.Describe the characteristics of and compute probabilities involving the normal distribution. 2. Calculate probabilities using the normal tables.

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Text Assignment	Recommended Homework Problems	Date (Week of)	Chapter Goals
<u>Chapter 7</u>	**7**: 1, 2, 9, 11, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 30, 31, 34, 35 **Hand in Assigned Problem # 2 in class on Oct. 3, manual solutions only.**	21 Sept & 28 Sep (26 Sept and 3 Oct)	1. Describe various sampling techniques. 2. Explain the Central Limit Theorem. 3. Explain sampling error. 4. Describe the Sampling Distribution of Means. 5. Define the Standard Error of the Mean.
<u>Chapter 8</u> Confidence Intervals	**8:** 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 19, 20, 21, 22, 25, 28, 29, 30, 34, 38, 39, 40, 41, 44	5 Oct (10 Oct)	1. Calculate confidence intervals for sample means and sample proportions. 2. Describe the characteristics and application of the Student t distribution. 3. Calculate confidence intervals using the Student t distribution.
Midterm exam		Saturday 17-Oct	**Subject to class progress**

UNIT 2

(Chapters 9, 10, 12-15)

Text Assignment	Recommended Homework Problems	Date (Week of)	Chapter Goals

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Chapter 9 Hypothesis Testing	**9:** 1, 2, 10, 11, 15, 18, 19, 20, 21, 22, 23, 25, 38, 39, 42	19 Oct (24 Oct)	1. Identify Type I and Type II errors. 2. Conduct a test of hypothesis about a population mean and a population proportion using critical z or t values and the p-value. 3. Conduct the test of hypothesis using one and two tail tests. 4. Conduct the test of hypothesis regarding a population mean using the sample standard deviation.
Chapter 10 Comparing Two Means and Two Proportions	**10:** 6, 8, 9, 16, 21, 22, 38, 41, 42	26 Oct (31 Oct)	1. Conduct a test of hypothesis about the difference between two population means involving large and small sample sizes and two population proportions. 2. Conduct the test of hypothesis regarding the difference in means of two independent samples and two independent proportions.
Chapter12 Experimental Design and Analysis of Variance	**12:** 3, 5, 6, 10 **Hand in Assigned Problems # 3, 4 and 5 on Nov 7. Include manual, excel and mega stat solutions.**	2 Nov (7Nov)	1. Understand the differences between various experiment designs and when to use them. 2. Compute and interpret the results of a one-way ANOVA. 3. Compute and interpret the results of a two-way ANOVA.

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Chapter 13 Chi-Square Tests	**13:** 3, 4, 6, 7, 17, 19, 20, 24, 25	2 Nov (7 Nov)	1. Understand and interpret interaction. 2. Understand the chi-square goodness-of-fit test and how to use it. 3. Analyze data by using the chi-square test of independence.
Chapter 14 Simple Linear Regression Analysis	**14:** 1, 2, 4, 7, 8, 12, 15, 20, 21, 24, 31, 34, 36, 37, 38, 39, 40, 42 **Hand in Assigned Problems # 6 & #7 on Nov 14. Include manual, excel and mega stat solutions.**	9 Nov (14 Nov)	1. Describe the relationship between an independent variable and a dependent variable. 2. Calculate and interpret the coefficient of correlation, the coefficient of determination and the standard error of the estimate. 3. Calculate the least squares regression line and interpret the slope and intercept values. 4. Test the slope of the line for statistical significance using critical z or t values and p-value. 5. Construct and interpret a confidence and prediction intervals for the mean and an individual value of the dependent variable.

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<u>Chapter 14</u> Simple Linear Regression Analysis		16 Nov (21Nov)	1. Regression and Correlation applications 2. Analysis of sums of squares for calculating the coefficient of determination and the standard error of the estimate. 3. A thorough analysis of the regression and correlation computer solutions provided by Mega Stat and by excel.
<u>Chapter 15</u> Multiple Regression and Model Building	**15:** 3, 4, 5, 9, 10, 11, 19, 20, 22, 23 **Hand in Assigned Problem # 8 on Nov 28. Include manual, excel and mega stat solutions.**	23 Nov (28 Nov)	1. Describe the relationship between two or more independent variables and the dependent variable using a multiple regression equation. 2. Interpret the multiple standard error of the estimate and the multiple coefficient of determination. 3. Conduct a test of hypothesis to determine if any of the set of regression coefficients differs from zero. 4. Understand multiple regression solutions provided by Excel and MegaStat.
<u>Chapter 15</u> Multiple Regression and Model Building	**15:** 6, 7, 8 **Hand in Assigned Problems #9 and #10 on Dec. 5. Include excel and mega stat solutions only.**	30 Nov (5 Dec)	1. Develop models to represent non-linear relationships. 2. Understand regression and multiple regression model assumptions. 3. Dummy variables 4. Adjusted r square

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Final Exam		Saturday 12-Dec	