

UNIVERSITY OF TEXAS AT BROWNSVILLE
School of Business
"Student Success Through Assurance of Learning!"

BUSIU 2341 - 02
Statistics
2009 Summer I

Instructor: Dr. Kalidas Jana

Class: EDBC 2.518

Class Hours: MTWTH 7:45 p.m. - 9:50 p.m.

Office: EDBC 2.432

Office Hours: MTWTHF 11:45 a.m. - 12:45 p.m. & by appointment

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Course Description:

An analysis of descriptive statistics and inference methods with emphasis on business applications. Topics include measures of central tendency and variation, probability distributions, sampling distributions, hypothesis testing, correlation, linear regression, index number, non-parametric statistics and other decision making tools. Pre-requisites: MATH 1314 (with minimum grade of C). BBA degrees require that this course be passed with a C or better.

Learning Outcomes:

Upon completion of this course, students should

- understand Fundamental Statistical concepts, including randomization, estimation, confidence, testing, and significance;
- have the ability to perform a wide variety of statistical calculations; and
- have the ability to describe data verbally, numerically, and graphically.

Method of Assessment of Learning Outcomes:

In-class assignments on every class-day, two midterms, and a final.

Required Course Material:

Text: The Practice of Business Statistics Using Data for Decisions, 2e, by David S. Moore, George P. McCabe, William M. Duckworth and Layth C. Alwan, © 2009 by W. H. Freeman and Company.

Study Guide: Student Solutions Manual for Moore, McCabe, Duckworth, and Alwan's The Practice of Business Statistics Using Data for Decisions, 2e, by Ellen Gundlach, © 2009, W. H. Freeman and Company.

Attendance Policy:

Attendance is mandatory. It accounts for 10% (=100 points) of your grade. If you miss classes without furnishing official letter of excuse, you will be counted as absent.

Homework, Class Participation and Earlyalert:

During class, I will ask you questions from the **Homework** assigned to you the previous class day. The purpose of asking questions is two-fold: (i) it is not to embarrass you but to make sure that you are not falling behind, and (ii) to help you grow confidence and do the best you can in my course. Because you are a UTB student, by definition, you are smart enough to learn the materials of this course. However, if for some reason you do fall behind, I can help you before it is too late through earlyalert. To learn about earlyalert please go to <http://blue.utb.edu/sa/counseling/earlyalert.htm>.

Office Hours:

I will be available to provide you as much help as you need both in and out of class. It is my intention to get to know each one of you well enough to be able to customize the learning experience to your individual needs. I hope that you will feel comfortable around me to let me know when there is something that I can do to help you out. You can expect to find me in my office not only during my scheduled office hours but also all day every day outside my class hours.

Blackboard Portal:

All information added by the instructor can be located on the Blackboard site for this course. In order to be able to use Blackboard, a student must call the Info Shop to obtain a pin or password if they do not already have one. For internet access to Blackboard go to <http://myutbtsc.blackboard.com>, or at the UTB website go to Current Students at the top of the webpage and select MyUTBTSC. At the Login screen, key your user name (first and last initials followed by your student ID number) and your password or PIN (Personal Identification Number). If you forget or don't know your 4digit pin, contact (956) 882-7611 or infoshop@utb.edu.

Web Site:

Additional materials will be posted on the web under the URL: <http://blue.utb.edu/kjana>.

Grading Policy:

Your grade will be determined as follows:

<u>Method 1:</u>	Percentage	Points
Attendance	10%	100
In-Class Assignment	10%	100
Midterm 1	25%	250
Midterm 2	25%	250
Final (Comprehensive)	30%	300

Method 2: Multiply the total number of points you will receive in the final exam by 3.33 (to make the Final 100%).

Compare your total points under Method 1 and Method 2 and assign letter grade for the course based on the higher of the two!

Grading Scale:

Points	Grade
900 - 1000	A
800 - 899	B
700 - 799	C
600 - 699	D
Below 600	F

Make-Up Exam Policy:

Make-up exams will be permitted only under conditions of emergency.

Review & Exam Schedule:

Midterm 1 Review Session: Tue, June 16

Midterm 1: Wed, June 17

Midterm 2 Review Session: Tue, June 23

Midterm 2: Wed, June 24

Final Exam Review Session: Wed, July 8

Final: Thu, July 9

Time Limit for Midterm & Final:

Midterm: 1 hour (from beginning of class period)

Final Exam: 2 hours (7:30 p.m. - 9:30 p.m.)

Format of Questions:

Short Answer and Numerical Problem Solving using EXCEL.

Academic Integrity:

Students are expected to be above reproach in all scholastic activities. Students who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. (Board of Regents Rules and Regulations)

All scholastic dishonesty incidents will be reported to the Dean of Students. Do not allow your peers to pressure you to cheat. Your grade, academic standing and personal reputation are at stake.

Incomplete Grades:

A grade of “I” may be given when students have not completed the required course work within the allotted time of a regular semester or summer session if the instructor determines that the reasons for the work being incomplete are valid and that the grade of “I” is justified. A written agreement between the student and the instructor specifying the work to be made up and the deadline for its accomplishment must be filed in the office of the Department Chair at the time that the “I” is submitted. The work agreed upon must be satisfactorily completed and the “I” changed no later than the end of the next regular (Fall or Spring) semester from the date the “I” was received unless an extension is requested by the instructor, or the grade will automatically be recorded as “F” on the official transcript. A student will not receive a grade of “I” to allow more time to prepare course work in addition to that assigned to the entire class, time to repeat the entire course, or opportunity to raise a grade. Incomplete grades are not issued for student or faculty convenience; they may be issued only in the case of compelling, nonacademic circumstances beyond the student’s control.

Withdrawing from Class:

After the official record date, students may withdraw from classes and receive a “W” on their permanent records. This deadline to withdraw is specified in the Academic Calendar for each enrollment period. Students who do not withdraw before the deadline may not be given a “W” on the final grade sheet. Students may withdraw from all of their classes through Scorpion Online, the STAR Telephone System (982-5800), or in person at the Office of the Registrar in Tandy Hall 105. The student is responsible for ensuring that their request is processed by the withdrawal deadline specified. At the instructor’s discretion, and consistent with the policy stated on the course syllabus, an instructor may withdraw a student from class for non-attendance. An instructor-initiated withdrawal may result in a “W” or an “F” on the student’s permanent record.

Americans with Disabilities Act (ADA):

Students with disabilities, including learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide documentation of his/her disability to the Disability Services counselor. For more information, visit Disability Services in the Lightner Center, call 956-882-7374 or e-mail steve.wilder@utb.edu.

Email Accounts:

All Business Administration students are required to have a UTB/TSC email account and password. Please use your UTB/TSC email account when corresponding with your professor; be sure to type your name and student ID at the end of the email.

Emergency Academic Continuity Plan:

In compliance with the Emergency UTB/TSC Academic Continuity Plan, academic courses, partially or entirely, will be made available on the MyUTBTSC Blackboard course management system. This allows faculty members and students to continue their teaching and learning via MyUTBTSC Blackboard <http://myutbtsc.blackboard.com>, in case the university shuts down as a result of a hurricane or any other natural disaster.

The university will use MyUTBTSC Blackboard to post announcements notifying faculty members and students of their responsibilities as a hurricane approaches our region. If the

university is forced to shut down, faculty will notify their course(s). To receive credit for a course, it is the student's responsibility to complete all the requirements for that course. Failure to access course materials once reasonably possible can result in a reduction of your overall grade in the class.

To facilitate the completion of class, most or all of the communication between students and the institution, the instructor, and fellow classmates will take place using the features in your MyUTBTSC Blackboard and UTB email system. Therefore, all students must use Scorpion Online to provide a current email address. Students may update their email address by following the link titled "Validate your e-Mail Account" in MyUTBTSC Blackboard Portal. In the event of a disaster, that disrupts normal operations, all students and faculty must make every effort to access an internet-enabled computer as often as possible to continue the learning process.

Food, Drink, and Cell Phone in the Classroom:

Consumption of food and/or drink, or use of cell phone, is strictly prohibited.

Satisfactory Academic Progress (SAP):

The following REVISED policy applies to new and returning UTB/TSC students registered for classes in the 2007-2008 academic year.

UTB/TSC monitors academic progress every fall and spring semester to identify those students who are experiencing difficulty with their courses. Satisfactory Academic Progress (SAP) is based upon two components: GPA of 2.0 or higher and successful course completion of at least 70% of course work attempted. Students remain in good standing with the university and Financial Aid when both criteria are met. Students who do not maintain these required minimum standards will be placed on probation or suspension as appropriate. The complete Satisfactory Academic Progress policy and the Undergraduate Satisfactory Academic Progress for Financial Aid policy can be found in the current Undergraduate Catalog. For more information, please visit MyUTBTSC Blackboard <http://myutbtsc.blackboard.com>; click on the Satisfactory Academic Progress link.

Academic Responsibilities:

Students are expected to be diligent in their studies and attend class regularly and on time. Students are responsible for all class work and assignments. On recommendation of the instructor concerned and with the approval of the Dean, students may, at any time, be dropped from courses. This may result in a "W" or "F" on the student's permanent record.

School of Business Volunteer Mentorship Program (VMP):

The VMP is sponsored by the School of Business and is made up of volunteer student mentors. These mentors will provide guidance to students on different career paths, school policies, programs of study, scholarships, internships, and other pertinent academic information. The program is available to all undergraduate students pursuing an AA or BBA in the School of Business. If you would need assistance by a student mentor, please contact Maribeth Deese in the Dean's office (EDBC 2.504) or call 882-5828.

Course Outline:

CHAPTER 1 Examining Distributions Introduction; **1.1 Displaying Distributions with Graphs** Categorical variables: bar graphs and pie charts; Quantitative variables: histograms; Case 1.1 State Unemployment Rates; Interpreting histograms; Quantitative variables: stemplots; Time plots; Sections 1.1 Summary; Section 1.1 Exercises; **1.2 Describing Distri-**

butions with Numbers Case: 1.2 Earnings of Hourly Bank Workers; Measuring center: the mean; Measuring center: the median; Comparing the mean and the median; Measuring spread: the quantiles; The five-number summary and boxplots; Measuring spread: the standard deviation; Choosing measures of center and spread; Section 1.2 Summary; Section 1.2 Exercises; **Case 1.3 The Normal Distributions**; Density curves; The median and mean of a density curve; Normal distributions; the 68-95-99.7 rule; The Standard Normal distribution; Normal distribution calculations; Finding a value when given a proportion; Assessing the Normality of data; **Beyond the basics: density estimation**; Section 1.3 Summary; Section 1.3 Exercises; **Statistics in Summary**; **Chapter 1 Review Exercises**; **Chapter 1 Case Study Exercises**; **Chapter 1 Appendix**.

CHAPTER 2 Examining Relationships Introduction; **2.1 Scatterplots** Case 2.1 Sales at a Retail Shop; Interpreting scatterplots; Adding categorical variables to scatterplots; Section 2.1 Summary; Section 2.1 Exercises; **2.2 Correlation** The correlation r ; Facts about correlation; Section 2.2 Summary; Section 2.2 Exercises; **2.3 Least-Squares Regression** The least-squares regression line; Facts about least-squares regression; Residuals; Influential observations; **Beyond the basics: scatterplot smoothers**; Section 2.3 Summary; Section 2.3 Exercises; **2.4 Cautions about Correlation and Regression** Beware of extrapolation; Beware of correlations based on averaged data; Beware of the lurking variable; Association is not causation; **Beyond the basics: data mining**; Section 2.4 Summary; Section 2.4 Exercises; **2.5 Relations in Categorical Data** Case 2.2 Marital Status and Job Level; Marginal Distributions; Describing relationships; Conditional distributions; Simpson's paradox; Section 2.5 Summary; Section 2.5 Exercises; **Statistics in Summary**; **Chapter 2 Review Exercises**; **Chapter 2 Case Study Exercises**; **Chapter 2 Appendix**.

CHAPTER 4 Probability and Sampling Distributions Introduction; **4.1 Randomness** The idea of probability; Thinking about randomness; Section 4.1 Summary; Section 4.1 Exercises; **4.2 Probability Models** Case 4.1 Uncovering Fraud by Digital Analysis; Probability Rules; Assigning probabilities: finite number of outcomes; Assigning probabilities: intervals of outcomes; Normal probability models; Section 4.2 Summary; Section 4.2 Exercises; **4.3 Random Variables** Probability distributions; The mean of a random variable; Rules for means; Case 4.2 Portfolio Analysis; The variance of a random variable; Rules for variances; Section 4.3 Summary; Section 4.3 Exercises; **4.4 The Sampling Distribution of a Sample Mean** Statistical estimation and the law of large numbers; **Beyond the basics: more laws of large numbers**; Sampling distributions; the mean and standard deviation of \bar{x} ; The central limit theorem; Section 4.4 Summary; Section 4.4 Exercises; **Statistics in Summary**; **Chapter 4 Review Exercises**; **Chapter 4 Case Study Exercises**.

CHAPTER 5 Probability Theory Introduction; **5.1 General Probability Rules** Independence and the multiplication rule; Applying the multiplication rule; The general addition rule; Section 5.1 Summary; Section 5.1 Exercises; **5.2 The Binomial Distributions** The binomial setting; Case 5.1 Inspecting a Supplier's Products; Binomial probabilities; Finding binomial probabilities: tables; Binomial mean and standard deviation; The Normal approximation to binomial distributions; Section 5.2 Summary; Section 5.2 Exercises; **5.3 The Poisson Distributions** The Poisson setting; The Poisson model; **Beyond the basics: more distribution approximations**; Section 5.3 Summary; Section 5.3 Exercises; **5.4 Conditional Probability** Conditional probability and independence; Tree diagrams and Bayes rule; Section 5.4 Summary; Section 5.4 Exercises; **Statistics in Summary**; **Chapter 5 Review Exercises**.

cises; Chapter 5 Case Study Exercises; Chapter 5 Appendix.

CHAPTER 6 Introduction to Inference Introduction; **6.1 Estimating with Confidence** Case 6.1 Community Banks; Statistical confidence; Confidence intervals; Confidence interval for a population mean; How confidence intervals behave; Choosing the sample size; Some cautions; **Beyond the basics: the bootstrap:** Section 6.1 Summary; Section 6.1 Exercises; **6.2 Tests of Significance** The reasoning of significance tests; Stating hypotheses; Test statistics; P-values; Statistical significance; Tests for a population mean; Two-sided significance tests and confidence intervals; P-values versus fixed α ; Section 6.2 Summary; Section 6.2 Exercises; **6.3 Using Significance Tests** How small a P is convincing? Statistical significance and practical significance; Statistical inference is not valid for all sets of data; Beware of searching for significance; Section 6.3 Summary; Section 6.3 Exercises; **6.4 Power and Inference as a Decision** The power of a statistical test; Increasing the power; Inference as decision; Two types of error; Error probabilities; The common practice of testing hypotheses; Section 6.4 Summary; Section 6.4 Exercises; **Statistics in Summary; Chapter 6 Review Exercises; Chapter 6 Case Study Exercises; Chapter 6 Appendix.**

CHAPTER 7 Inference for Distributions Introduction; **7.1 Inference for the Mean of a Population** The t distribution; The one-sample t confidence interval; Case 7.1 Producing a Fortified Food Product; The one-sample t test; Using software; Matching pairs t procedures; Robustness of the t procedures; The power of the t test; Inference for non-Normal populations; Section 7.1 Summary; Section 7.1 Exercises; **7.2 Comparing Two Means** The two-sample z statistic; The two-sample t procedures; The two-sample t significance test; The two-sample t confidence interval; Robustness of the two-sample procedures; Inference for small samples; Satterthwaite approximation for the degrees of freedom; The pooled two-sample t procedures; Case 7.2 Healthy Companies versus Failed Companies; Section 7.2 Summary; Section 7.2 Exercises; **7.3 Topics in Comparing Distributions** Inference for population spread; The F test for equality of spread; The power of the two-sample t test; Section 7.3 Summary; Section 7.3 Exercises; **Statistics in Summary; Chapter 7 Review Exercises; Chapter 7 Case Study Exercises; Chapter 7 Appendix.**

CHAPTER 10 Inference for Regression Introduction; **10.1 Inference about the Regression Model** Statistical model for simple linear regression; From data analysis to inference; Case 10.1 Do Wages Rise with Experience? Estimating the regression parameters; Conditions for regression inference; Confidence intervals and significance tests; The word “regression”; Inference about correlation; Section 10.1 Summary; Section 10.1 Exercises; **10.2 Using the Regression Line Beyond the basics: nonlinear regression** Section 10.2 Summary; Section 10.2 Exercises; **10.3 Some Details of Regression Inference** Standard errors; Analysis of variance for regression; Section 10.3 Summary; Section 10.3 Exercises; **Statistics in Summary; Chapter 10 Review Exercises; Chapter 10 Case Study Exercises; Chapter 10 Appendix.**

CHAPTER 11 Multiple Regression Introduction; Case 11.1 Assets, Sales, and Profits; **11.1 Data Analysis for Multiple Regression** Data for multiple regression; Preliminary data analysis for multiple regression; Estimating the multiple regression coefficients; Regression residuals; The regression standard error; Section 11.1 Summary; Section 11.1 Exercises; **11.2 Inference for Multiple Regression** Multiple linear regression model; Case 11.2 Predicting College GPA; Estimating the parameters of the model; Inference about the regression coef-

ficients; Inference about prediction; ANOVA table for multiple regression; Squared multiple correlation R^2 ; Inference for a collection of regression coefficients; Section 11.2 Summary; Section 11.2 Exercises; **11.3 Multiple Regression Model Building** Case 11.3 Prices of Homes; Models for curved relationships; Models with categorical explanatory variables; More elaborate models; Variable selection methods; **Beyond the basics: multiple logistic regression**; Section 11.3 Summary; Section 11.3 Exercises; **Statistics in Summary**; **Chapter 11 Review Exercises**; **Chapter 11 Case Study Exercises**; **Chapter 11 Appendix**.

CHAPTER 12 Statistics for Quality: Control and Capability Introduction; Processes; Systematic approach to process improvement; Process improvement toolkit; Case 12.1 Hot Forging; **12.1 Statistical Process Control** \bar{x} charts for process monitoring; Case 12.2 Manufacturing Computer Monitors; s charts for process monitoring; Section 12.1 Summary; Section 12.1 Exercises; **12.2 Using Control Charts** \bar{x} and R charts; Additional out-of-control signals; Setting up control charts; Case 12.3 Viscosity of an Elastomer; Comments on statistical control; Don't confuse control with capability! Section 12.2 Summary; Section 12.2 Exercises; **12.3 Process Capability Indexes** The capability indexes C_p and C_{pk} ; Cautions about capability indexes; Section 12.3 Summary; Section 12.3 Exercises; **Control Charts for Sample Proportions** Control limits for p charts; Case 12.4 Reducing Absenteeism; Section 12.4 Summary; Section 12.4 Exercises; **Statistics in Summary**; **Chapter 12 Review Exercises**; **Chapter 12 Appendix**.

CHAPTER 13 Time Series Forecasting Introduction; **13.1 Trends and Seasons** Identifying trends; Case 13.1 Selling DVD Players; Seasonal patterns; Looking for autocorrelation; Section 13.1 Summary; Section 13.1 Exercises; **13.2 Time Series Models** Autoregressive models; Moving average models; Exponential smoothing models; **Beyond the basics: spline fits**; Section 13.2 Summary; Section 13.2 Exercises; **Statistics in Summary**; **Chapter 13 Review Exercises**; **Chapter 13 Appendix**.

CHAPTER 17 Logistic Regression Introduction; **17.1 The Logistic Regression Model** Case 17.1 Binge Drinkers; Binomial distributions and odds; Model for logistic regression; Fitting and interpreting the logistic regression model; Section 17.1 Summary; **17.2 Inference for Logistic Regression** Examples of logistic regression analyses; Section 17.2 Summary; **17.3 Multiple Logistic Regression** Section 17.3 Summary; **Statistics in Summary**; **Chapter 17 Review Exercises**; **Chapter 17 Case Study Exercises**.

CHAPTER 18 Bootstrap Methods and Permutation Tests **18.1 Why Resampling?** **18.2 Introduction to Bootstrapping** Case 18.1 Telecommunication Repair Times; Procedure for bootstrapping; Why does bootstrapping work? Sampling distributions and bootstrap distribution; Section 18.2 Summary; section 18.2 Exercises; **18.3 Bootstrap Distributions and Standard Errors** Case 18.2 Real Estate Sale Prices; Bootstrap distributions of other statistics; Bootstrap t confidence intervals; Bootstrapping to compare two groups; **Beyond the basics: the bootstrap for a scatterplot smoother**; Section 18.3 Summary; Section 18.3 Exercises; **18.4 How Accurate is Bootstrap Distribution?** Bootstrapping small samples; Bootstrapping a sample median; Section 18.4 Summary; Section 18.4 Exercises; **18.5 Bootstrap Confidence Intervals** Bootstrap percentiles as a check; Confidence intervals for the correlation; Case 18.3 Baseball Salaries and Performance; More accurate bootstrap confidence intervals; Bootstrap tilting and BCa intervals; How BCa and tilting intervals work; Section 18.5 Summary; Section 18.5 Exercises; **18.6 Significance Testing Using Permu-**

tation Tests; Permutation tests in practice; Permutation tests in other settings; Section 18.6 Summary; Section 18.6 Exercises; **Statistics in Summary**; **Chapter 18 Review Exercises**.

IMPORTANT!!! Your goal will be UNDERSTANDING the materials, NOT MEMORIZING them. Quizzes and exams will be written to test your understanding of the different statistical concepts and techniques, not how much you can memorize. Finally, if you have any questions or concerns, please do not hesitate to let me know at your earliest convenience, either in class, or in office, or through e-mail. Help me help you earn the best grade you can for this class.

School of Business Mission Statement

The mission of the UTB/TSC School of Business is to prepare students in the bicultural Lower Rio Grande Valley of Texas for their careers by offering associate, bachelor, and master degree business programs. As part of a community university focused on student learning, the School of Business emphasizes teaching, enriched by scholarship and service, to help students develop analytical, problem solving, and information technology skills; supports the development of the communication skills of our predominantly bilingual students; provides a supportive learning environment; and encourages ethical behavior and involvement with the business community.