# Dillard College of Business Administration

**Syllabus: Advanced Applied Business Statistics**
**BUAD 5603, X20**
**Online Instructional Method**
**Spring 2024**

**CONTACT INFORMATION:**


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|---|---|
| Instructor: | Dr. John E. Martinez |
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BUAD 5603, Section 180, Advanced Applied Business Statistics,
Course Number 10194 uses supplemental Desire2Learn.
Attributes: Course Exempt from 3-peat rule, Course Fee –
Business Administration, COBA, Instructional Enhance Fee
Main Campus Lecture Schedule Type
Traditional Face to Face Instructional Method 3.000 Credit Hours
Scheduled Meeting Times – Jan 16, 2024 through May 7, 2024

**SYLLABUS CHANGE POLICY:**
This syllabus is a guide for the course and is subject to change. All changes will be announced in class and students will be responsible for incorporating the changes into the syllabus. If, at some point, the university switches to an online format, then there will be significant changes in the manner in which exams are administered. Any exam taken online will be monitored through RESPONDUS, which will require students to have access to a webcam video.

COURSE MATERIALS:

**Access to SAS OnDEMAND for Academics and to EXCEL**

SAS University Edition was a free version of SAS, but you had to download software to create a virtual computer on your real computer, then download the SAS software, and finally, set up a way to read and write files from your "real" computer to the "virtual computer." This caused many people massive headaches (including this author).

The great news about SAS OnDemand for Academics (hence forth called **ODA – OnDemand for Academics**) is that you don't have to download anything! You access SAS on a cloud platform. Also, reading data from your real computer is quite simple. **ODA uses SAS Studio as the interface.** SAS Studio provides an environment that includes a point-and-click facility for performing many common tasks, such as producing reports, graphs, data summaries, and statistical tests. SAS Studio enables you to write and run your own programs.

Registering for ODA

To gain access to ODA, you need to register with SAS Institute. Part of the registration process is to create a SAS profile. If you already have a SAS profile, skip that portion of the instructions. To start, point your browser to: https://welcome.oda.sas.com

## Required Text: A Gentle Introduction to Statistics Using SAS® Studio in the Cloud


978-1-954844-49-0 (Hardcover)
978-1-954844-45-2 (Paperback)
978-1-954844-46-9 (Web PDF)
978-1-954844-47-6 (EPUB)
978-1-954844-48-3 (Kindle)

**RECOMMENDED Text:**

Introductory Business Statistics: This text is Free online:
https://openstax.org/details/books/introductory-business-statistics
Publish Date: Nov 29, 2017 Web Version Last Updated: Jun 23, 2022
Hardcover: ISBN-10: 1-947172-46-8 ISBN-13: 978-1-947172-46-3
Paperback: ISBN-13: 978-1-50669-984-4
Digital: ISBN-10: 1-947172-47-6 ISBN-13: 978-1-947172-47-0

The text is designed to meet the scope and sequence requirements of the one-semester statistics course for business, economics, and related majors. Core statistical concepts and skills have been augmented with practical business examples, scenarios, and exercises. The result is a meaningful understanding of the discipline, which will serve students in their business careers and real-world experiences.

Anderson, Sweeney, and Williams: Statistics for Business and Economics, 5e 2009, Thomson South-Western ISBN 13: 978-0-324-65421-9 ISBN 10: 0-324-65422-7
This text is designed to help students fully understand descriptive and inferential statistical analysis, its components, and its uses. Taking into consideration current statistical technology, its focuses demonstrating the logic, reasoning, and calculations that lie behind any statistical analysis. Furthermore, the text emphasizes the application of statistical tools to real-life business concerns.

**OTHER ANCILLARY MATERIAL:**
**In addition to the two texts, students need to have access to the following:**

- WebCam video
- Thumb drive:

Each student should have a thumb drive (USB) on which to keep various data sets and assignments that will be a part of each class. Projects and assignments may include the requirement that electronic versions of your work be submitted. If students have access to MSU-DCOBA labs, then downloading the SAS software is not necessary. SAS software is installed in most DCOBA labs.

**Course Description**
Taking into consideration current statistical technology, the course focuses on the use and interpretation of software, while also demonstrating the logic, reasoning, and calculations that lie behind any statistical analysis. Furthermore, the course emphasizes the application of statistical tools to real-life business concerns.
The course is structured around the most commonly used SAS statistical procedures. You will also learn how to test the assumptions for all relevant statistical tests. Major topics featured include descriptive statistics, one-and two-sample tests, ANOVA, correlation, linear and multiple regression, and analysis of categorical data.

**Course Pre-requisites - BUAD 3033 or equivalent and consent of Graduate Coordinator.**

**LEARNING GOALS**
**A. General Learning Goals (GLC):**

- The general objective of this course is to review and solidify the knowledge gained in undergraduate statistics course and enhance the ability to use statistical analysis in decision-making process.
- Problem solving and decision making abilities through critical analysis, evaluation and interpretation of business information. Problem solving skills and interpretation of results will be assessed exams and quizzes.
- Ability to use statistical Software **(with emphasis on SAS and EXCEL).**
- Ability to comprehend statistical discussions and comment on them.

**General Learning Goals (GLC) associated with Assessment of Learning (AOL)**

**GLG3: Students will produce creative responses to business situations.**
Objective: Our graduates will demonstrate the capability to critically analyze business situations and develop creative solutions to opportunities and problems.

**GLG4: Our students will integrate knowledge across business disciplines.**
Objective: Graduates will demonstrate the capability to integrate knowledge across business disciplines.

**GLG5: Our students will communicate (in written form) at a professional level.**

Objective: Graduates will be able to communicate in a professional business manner.

**B. Course Specific Learning Goals:**

- Summarize data using descriptive statistics.
- Understand the appropriate methodology for computing all statistical measures covered in this course.
- Apply basic statistical measure to the solution of structured business problems and interpret results.
- Understand the Ordinary Least Squares (OLS) model and its applications.
- Apply hypothesis testing to business problems and estimates of coefficients.

**COURSE POLICIES:**
**A. Attendance Policy:**

Being an online course, physical classroom attendance is not required. However, students are expected to access all videos and taped lectures for this course. Many important announcements are provided for this course. You are expected to log into D2L a minimum of once daily to check for updates and announcements via postings and email. See the MSU university catalog for the University Class Attendance Policy.

**B. Other Related Policies**
**Electronic Communication Devices**
Use of personal electronic communication devices, other than through D2L, is discouraged during exams and students are required to disable any other electronic instruments during exams. Individuals holding devices that disrupt class may be asked to leave the class for the remainder of the session.

**Expectation**
Answers you provide in exams and case studies are expected to reflect logical reasoning, to be well articulated, including correct grammar and punctuation and to be clearly legible, in a manner and format that would be acceptable for a business report in a commercial setting. Students will be expected to develop a base knowledge in using SAS. Each student is expected to become sufficiently familiar with the Desire-2-Learn (D2L), as it will be a primary communication instrument for this class.

**GRADING and EVALUATIONS:**
A student's grade will be based on a weighted average of the following:

| | | |
|---|---|---|
| MAJOR EXAMS | | 40% |
| Exam I | 20% | |
| Exam II | 20% | |
| FINAL EXAM | | 30% |
| MANAGERIAL CASES | | 30% |
| Case Set I – Written Presentation | 10% | |
| Case Set II – Written Presentation | 10% | |
| Case Set III – Written Presentation | 10% | |

**GRADE EVALUATION:**
As a **percent** of total points (1000pts):
A (Above 90%), B (80-89%), C (70-79%), D (60-69%), F (below 60%)
**Total Points:**
[Exam Avg. X 4.0] + [Final X 3.0] + [Case Avg. X 3.0] + Bonus Points

**Major exams:**
Two major exams will be given. Each exam will involve calculation and derivation of answers as well as their interpretation and meaning. Questions will come from the text and notes. **A significant portion of each exam involves interpreting output derived from SAS and EXCEL as well as from Managerial Cases.** Exams will be objective-type exams [TF or MC] monitored through RESPONDUS.

Failure to take an exam on the scheduled date without prior permission from the instructor will result in a zero for that exam. Failure to take any exam without prior approval will result either in an 'F' or 'I' (incomplete) for the course. If, because of a truly unavoidable situation, you are absolutely not able to take an exam at the scheduled time/date, it is your responsibility to contact your instructor well in advance to ask to take the exam early. If a real, legitimate, last minute emergency occurs, it is your responsibility to contact me before the exam begins.

**SAS Programs:**
Students are required to duplicate SAS output from the following three sets of figures from the text, A Gentle Introduction to Statistics Using SAS. The output for each set is due on each scheduled exam date. It is absolutely essential to have the individual assignments complete before each exam is administered. That is because several exam questions will be from the produced output. Dropbox folders will be set up on D2L for students to submit this assignment. See attachment below for each exam requirements: **Required Output from A Gentle Introduction to Statistics Using SAS**

**Final exam:**
A comprehensive final exam will be given with greater emphasis on later material. This exam will be an objective-type exam [TF or MC].

**Managerial Cases – Written Assignments:**
Three Managerial Cases are required, one from each set. The goal of each case is to correctly understand a business situation, solve a real problem, and make a good business decision. Designated cases with specific formatting guidelines are attached at the end of this syllabus. Statistical output for these cases will be generated using SAS. More detailed information about this requirement can be found in the attachment below:
**Format for Managerial Case Writing Assignments**

**Lower Grades:**
The instructor reserves the right to lower any student's final grade by a letter grade (i.e., A to B, D to F) for:
(A) A negative, rude, unreasonably argumentative or inattentive attitude in class, or,
(B) Repeatedly disrupting the class for any reason (tardiness), or,
(D) **NOT** showing respect for fellow classmates' questions, opinions, or class presentations.

**Campus Carry:**
Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at Campus Carry Polices Link.

**Academic Integrity:**
With regard to academic honesty, students are referred to the "Student Honor Creed" of Midwestern State University Undergraduate Catalog, which may be found using the following MSU link: Link to Student Honor Creed.

**Americans with Disabilities Act:**
This class follows the guidelines suggested by the Center for Counseling and Disabilities Services for those students who qualify for disability services. See Midwestern State University Undergraduate Catalog which may be found at: Link to Suggested Guidelines Center for Counseling and Disabilities Services.

**D2L:**
The Midwestern State University D2L program will be incorporated into this class and will provide the primary default means of communication. Each student is expected to master the use of D2L. Assistance to achieve comfort using this program will be available as needed. Grades will be posted using D2L.

**OTHER RELEVANT INFORMATION:**

**Midwestern State University Student Handbook:**

See the most recent MSU Student Handbook for a statement of the university's policy on academic dishonesty. Any other questions not specifically addressed by this syllabus are governed by the student handbook.

**Medical or Other Serious Problems:**

Please take time and make the effort to advise me if you have difficulties that require my attention to properly evaluate your classroom participation and activities.

**Tape Recordings and Cell Phones:**

Tape recording of lectures is permitted. You may not tape record any information or class discussion when a graded test is being reviewed. Cell phones and pagers are prohibited unless the instructor has granted permission to have them in class.

**Return of Exams:**

Never download or take a photo of any exam or graded answer sheet. This will result in an automatic zero (0) on the exam.

**Plagiarism Statement:**

"By enrolling in this course, the student expressly grants MSU a "limited right" in all intellectual property created by the student for the purpose of this course. The "limited right" shall include but shall not be limited to the right to reproduce the student's work product in order to verify originality and authenticity, and educational purposes."

**Correspondence**

All correspondence regarding grades or class issues must be conducted through email using your **Midwestern State University (MSU) email or through D2L**. I will not return answers to questions to other email accounts and will not discuss grades or class standing over the phone. Since email or D2L messages are the most convenient means of communication, it is recommended that students use and regularly monitor their MSU email and D2L account. You must adhere to the following subject line of any message sent to me via text message or email: **BUAD 5603 First, Last Name.**

**Netiquette: Communication Courtesy Code**

Students are expected to follow rules of common courtesy in all email messages, class discussions, lecture hall posts, chats, etc. If I consider any of them to be inappropriate or offensive, I will forward the message to the Chair of the department and the online administrators and appropriate action will be taken.

**Deadlines**

**Do not wait for the last minute to do any assignment.** Check D2L for all assignments and the deadlines. Reply and check for replies on every email sent and received. The student is responsible for getting the work to me on time.

**Spring Semester 2023 Schedule**
https://msutexas.edu/registrar/_assets/files/pdfs/acadcal23241.pdf

**Student Registration .....Early November-January 15**
**Martin Luther King's Birthday .....January 15**
**Classes begin.....January 16**
**Change of Schedule and Late Registration.....January 16-19**
**Part of Term A Last Day for "W", 4:00 p.m. – Drops after this date will receive grades of "F." .....February 28**
**Spring Break begins 5:00 p.m. (March 10-16) ..... March 9**
**Classes resume .....March 18**
**Holiday Break begins 10:00 p.m. .....March 27**
**Classes resume ..... April 1**
**Last day of classes..... May 3**
**Final examinations begin ..... May 4**
**Commencement ..... May 11**

**Course Schedule – Schedule is subject to change**

| Class | Class Coverage |
|---|---|
| Week01 | Class Expectations and Requirements<br>Descriptive and Inferential Statistics – Cody<br>Study Designs – Cody |
| Week02 | Data and Statistics<br>Descriptive Statistics |
| Week-2 | Descriptive Statistics |
| Week-3 | Into to Probability<br>Discrete Probability Distributions |
| Week-3 | Continuous Probability Distributions |
| Week-4 | Chap03 – What is SAS OnDemand – Cody<br>Chap04 – SAS Studio Tasks – Cody |
| Week-4 | Chap05 – Importing Data into SAS – Cody<br>Chap06 – Descriptive Statistics – Cody |
| Week-5 | Review for MGR Cases for Exam I |
| Week-5 | **Exam I [8:00 am Feb 8 – 11:59 pm Feb 10]**<br>**First Case from Set I due by midnight Feb 6** |
| Week-6 | Sampling and Sampling Distributions<br>Interval Estimation |
| Week-7 | Chap07 One-Sample Tests – Cody<br>Chap08 Two-Sample Tests - Cody |
| Week-8 | Chap11 Tests of Independence<br>Chap14 – Analyzing categorical data – Cody |
| Week-9 | Review for MGR Cases for Exam II |
| Week-9 | **Exam II [8:00 am Mar 21 – 11:59 pm Mar 23]** |
| Week-10 | Hypothesis Tests Analysis of Variance<br>Chap09 Comparing More than Two Means – Cody |

| Class | Class Coverage |
|---|---|
| Week11 | Chap11 Correlation – Cody |
| Week12 | Simple Regression |
| Week13 | Multiple Regression |
| Week14 | Chap12 Simple and Multiple Regression - Cody |
| Week15 | Review MGR cases for Exam III |
| Week16 | Review for FINAL Exam III |
| | **Final Two Cases due by Midnight on Monday May 6, 2024** |
| | **Final Exam [8:00-10:00 pm] Tuesday, May 7, 2024** |

*All Dates are Tentative

Final Exam schedule can be found in the **Spring Schedule of Classes**. Please check the following link: https://msutexas.edu/registrar/_assets/files/pdfs/spring23finals.pdf

### Format for Managerial Case Writing Assignments

- Each student is responsible for completing **three** designated Managerial Case Reports one from each set (see list below). Managerial cases are to be submitted in a Dropbox submission folder on D2L. The following cases, which will be provided via MSU's D2L platform:
  - **Managerial Case Set I**
  - Select 1 of the following cases: Amtech, Plastiks, and Datastor.
  - **Managerial Case Set I**
  - Select 1 of the following cases: Keels, Circuit, and ServePro.
  - **Managerial Case Set III**
  - Select 1 of the following cases: Easton, Pronto, and Ryder.

- Each case should include the following components:
  1. Statement of the problem
  2. Statistical Results
  3. Policy conclusions

  Append the following to each case:
  1. **SAS Code used**
  2. **SAS Output with tables referenced**

## Guidelines for Written Case Presentations

- Provide the following information at the beginning of each case:
  **First, Last Name**
  **Case title (i.e., Circuit, etc,)**
  **Semester, Year**
- First and foremost - remember that this is a managerial case presentation. Therefore, do not write it in an academic format, but rather in an easily readable and understandable format for a manager.
- Be sure to include **your name** and **Case title** at the top of the first page of your report. No cover sheet is required.

- Be sure to include an **introductory paragraph** as to what the case all about, or what problems need to be addressed.
- A second section presenting your **key statistical results** should follow your introductory paragraph. This section should include all important statistical results on which your policy recommendations are based.
- If you happen to use descriptive statistics with EXCEL or SAS, you should exclude information that is not relevant for the case. For example: Would a manager actually care about kurtosis?
- Be **sure** to provide an appropriate title and number for each chart, graph, or table you use. Also, make sure that each chart, graph, or table is referenced in the body of the text.
- Write in paragraph form with complete sentences and correct grammar.
- For most histograms, use class intervals that are easy to read, such as in intervals of 10, 100, or 1000.
- Except where fractional values are relevant, use whole numbers. For instance, is it necessary to know that the average age is 28.46, or is 28 years sufficient?
- Do not include information from Proc Contents or Proc Print.
- A well-defined **summary and conclusions section, following the statistical results section,** should be included along with policy recommendations.
- APPENDIX I – Include only SAS code used.
- APPENDIX II – Include only SAS statistical results used. At the very top of the first page of this appendix, be sure to screenshot your ODA SAS registration name or number. Do not type the registration name or number.
- Staple your work when turning in hard copies.
- For online classes only, submit your cases on D2L under ASSESSMENTS-ASSIGNMENTS in appropriate submission folder for MGR cases.
- Late work will be penalized.

**Required Output from <u>A Gentle Introduction to Statistics Using SAS</u>**

1. Cody-Figure 4.13 – The Results Window –
2. Cody-Figure 4.14 – Displaying the Results in Browser Window
3. Cody-Figure 5.6 – Contents Grades.xlsx
4. Cody-Figure 5.19 – Edited Output from Import Task
5. Cody-Figure 5.28 – Listing of Data Set
6. Cody-Figure 6.8 - Histogram and Box Plot for MSRP
7. Cody-Figure 6.14 – Frequencies for the Variable Cylinders
8. Cody-Figure 6.19 – Distribution of Horsepower for cars with Four cylinders
9. Cody-Figure 6.22 – Box Plots Showing Horsepower for four- and six-cylinder Cars
10. Cody-Figure 6.22 – Box Plots Showing Horsepower for Four- and Six-Cylinder Cars

**Exam I**

11. Cody-Figure 7.7 – Tests for Normality
12. Cody-Figure 7.8 – t test Results
13. Cody-Figure 8.8 – Table for Assumptions of Variances
14. Cody-Figure 8.24 – Statistics, t- and p-values
15. Cody-Figure 14.10 – Table of gender by Median
16. Cody-Figure 14.11 – Measures of Association

17. Cody-Figure 14.16-17 – Odds Ratios and Relative Risks

**Exam II**

18. Cody-Figure 9.5 – ANOVA Table
19. Cody-Figure 9.6 – Box Plot by Method
20. Cody-Figure 9.9 – Least square Means
21. Cody-Figure 11.14 – Pearson and Spearman Correlations
22. Cody-Figure 11.14 – Pearson and Spearman Correlations
23. Cody-Figure 12.7 – First Section of Linear Regression Output
24. Cody-Figure 12.12 – Matrix of Scatter Plots
25. Cody-Figure 12.16 – Output Including the VIF
26. Cody-Figure 12.17 – Output from Model with Endurance Removed
27. Cody-Figure 12.17 – Output from Model with Endurance Removed
28. Cody-Figure 12.21 – Four Methods for Determining when to stop adding Variables
29. Cody-Figure 12.23 – Output Using Gender as a Predictor Variable
30. Cody-Figure 12.24 – Parameter Estimates for Gender and Strength

**Final III**