SYLLABUS
B BUS 502
QUANTITATIVE METHODS AND BUSINESS STATISTICS

Course Description

This course reviews descriptive statistics, exploratory data, and probability distributions. We will then examine the theory and methods of statistical inference, emphasizing those applications most useful in modeling business problems. Topics include sampling theory, estimation, hypothesis testing, linear regression, analysis of variance, and several advanced applications of the general linear model.


Technology
Microsoft Excel, Tableau (license number provided)

Learning Objectives

☐ Understand the basic concepts of both descriptive and inferential statistics.
☐ Appreciate the usefulness and limitations of inferential methods widely used in management analysis.
☐ Demonstrate the ability to analyze data using statistical methods.
☐ Demonstrate the ability to build and test explanatory models.
☐ Understand how to build a case for causation based on correlational data, and appreciate the limitations of using correlational methods to test theories of causation.
☐ Understand some common biases in interpreting statistical results (why they occur and how they can be prevented).
☐ Be skilled at interpreting statistical results presented in professional reports and journals.
☐ Be skilled at organizing and presenting statistical information in a format that will facilitate informed management judgments.

Topics Examined:

☐ Review of Fundamental Concepts
  o Descriptive Statistics/Exploratory Data Analysis
  o Visualization of Data**
  o Probability Distributions

☐ Statistical Inference (Basics)
  o Sampling Distributions/Sampling Error
  o Estimation: Means
Estimation: Proportions
Hypothesis Testing: Single Population
Sample Size Determination
Sampling Methods
Managing Total Survey Error
Statistical Power
- Statistical Inference: Comparing Two Populations
  - Hypothesis Testing: Comparing Two Related Populations
  - Hypothesis Testing: Comparing Two Independent Populations
- Multiple Regression Analysis
  - Statistical model and Assumptions
  - Statistical Inference in Multiple Regression
  - Correlation and Causation
  - Interpreting Regression Results
  - Modeling Techniques (linear, curvilinear)
  - Variable Selection and Model Refinement
  - Time-series Regress (trends, lagged effects, seasonal effects)
- Experimental Design and Analysis of Variance
  - Experimental Design
  - One-Way Analysis of Variance

** a new topic added 2011 which coincides with the textbook and student requests

### Instructional Method

- **Interactive Classes.** Class time will be devoted to short lectures, problem solving, in class exercises and discussion. The participation of students in these activities will contribute to the learning experience of all students in the class.

- **Case Studies.** Students will acquire many important insights outside of class through case analysis and group collaboration. A case study describes a business problem. Working in small teams, students will analyze the problem, recommend a solution, and defend their recommendation. Most cases will require considerable statistical analysis on the computer.

- **Tableau project:** Students will use need to utilize Tableau software to visually analyze data and draw inferences. In class, Tableau will be demonstrated. If your computer is not Tableau accessible, we will have it available in a computer lab on campus or will arrange to have you pair up with a classmate.

### Case studies

Please prepare thoroughly for all case. Before we discuss a case in class, read it carefully, conduct any necessary statistical analysis and review your findings with other class members. Attempt to identify and solve the critical managerial problem(s) suggested in the case. Several of the cases are complicated. Do not be frustrated if you have difficulty with them, and do not hesitate to contribute to class discussion even if you are unsure of your recommendation. Generally, there is no single
correct solution to a case problem. Your job is to thoughtfully analyze the case and to present your findings.

**Grading**

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<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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<tr>
<td>Case Write-ups</td>
<td>100</td>
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<tr>
<td>Tableau Project</td>
<td>100</td>
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<tr>
<td>Midterm Exam</td>
<td>100</td>
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<tr>
<td>Final Exam</td>
<td>100</td>
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**Exams:** Tests will be based on terminology, equations, methods, and applications from the book.

**Case write-ups:** To receive full credit for a case write-up, you must attend the in-class discussion of that case. Note that these assignments will be meticulously graded for composition. All case study assignments must be submitted **in class** no later than the designated due dates.

**Tableau project:** To receive full credit for the Tableau project, a dashboard should be created and uploaded with explanations of how the viz is used to uncover potential trends and hypotheses. An example will be provided to the class.