



- Recognize situations where non-parametric tests are pertinent and perform a few common tests using the computer.
- Use regression terminology correctly, analyze bivariate data (scatter plots, correlation, simple regression), and know the assumptions of least-squares regression.
- Fit trends and make forecasts from time series data using appropriate computer tools.
- Estimate a multiple regression, perform significance tests, and interpret the results. Understand the importance of data conditioning, know when a model may be over-fitted and why that can be a problem, and perform diagnostic tests for model adequacy (multicollinearity, residual tests, leverage).
- Interpret common process control charts and apply simple pattern recognition rules to detect out-of-control processes.
- Use computers confidently and write effective technical reports.

**Homework:** I will assign homework problems on a regular basis. These assignments will not be graded and are strictly for the student's edification. They should be regarded as prototypes of the questions and problems that will be posed on the exams. I cannot emphasize enough the importance of working the homework problems on a timely basis. Such extra effort will surely bear fruit with respect to your performance on the exams.

**Problem Sets:** Three graded problem sets will be assigned during the term. The problem sets will account for 10% of your course grade.

**Computer Assignments:** There will be four computer projects assigned during the term. The four assignments will account for 15% of the student's grade.

**Examinations:** There will be three examinations during the term. They will take place on the following dates:

Exam I	Wednesday, February 10
Exam II	Wednesday, March 24
Exam III	<b>Monday, April 26 (9:00-11:00 a.m.)</b>

Each exam will cover approximately 1/3 of the course. The last exam is not comprehensive.

**Make-Up Exams:** Make-up exams will only be given at my discretion. Work related reasons for missing exams are generally not acceptable. Should I decide to let you take a make-up exam, you will be allowed to do so at a mutually convenient time *during finals week*.

**Academic Conduct Policy:** Students are advised to familiarize themselves with the Oakland University Academic Conduct Policy articulated on pp. 77-78 of the Undergraduate Catalog ([http://www2.oakland.edu/catalog/undergrad/2009\\_2010\\_undergrad\\_catalog.pdf](http://www2.oakland.edu/catalog/undergrad/2009_2010_undergrad_catalog.pdf)). I have a **zero tolerance policy** for cheating. Cheating is easily detectable. If you give the appearance of cheating, then I will immediately refer your case to the Office of the Dean of

Students. If your exam answers are copied by another student, then I will assume that you are complicit in the academic misconduct and such cases will also be submitted to the Dean of Students. (To prevent your answers from being copied by another student, simply protect your work.) Penalties for cheating at Oakland are excessive and usually result in a 0.0 for the course and suspension or expulsion.

### **Class Assessment and Assignment Weights:**

<b>Assessment</b>	<b>Dates</b>	<b>Weight</b>
Exam I	February 10	25%
Exam II	March 24	25%
Exam III	April 26	25%
Problem Sets	As assigned	10%
Computer Assignments	As assigned	15%

**Text:** *Applied Statistics in Business and Economics*, 2<sup>nd</sup> edition, by David P. Doane and Lori E. Seward, 2009. New York, N.Y.: McGraw-Hill.

### **COURSE OUTLINE**

I will cover topics in the following order:

- I. Descriptive Statistics: Types of data, graphical techniques for data, measures of central location, measures of dispersion, data exploration.

Read pp. 25-36, 61-81, 115-148.

- II. Probability: Probability theory, rules of probability, probability trees, Bayes' law.

Read Ch. 5.

- III. Random Variables and Discrete Probability Distributions: Random variables, expected value, variance, the Binomial distribution.

Read pp. 217-222, 227-235, 250-252.

- IV. Continuous Probability Distributions: Uniform distribution, normal distribution, standard normal distribution, normal probabilities.

Read pp. 261-280.

- V. Sampling Distributions: Central Limit Theorem, sampling distribution of  $\bar{x}$ , properties of estimators.
- Read pp. 303-314.
- VI. Estimation: Point versus interval estimators, estimating the mean, estimating the population proportion, estimating the difference between two means, estimating the difference between two proportions, estimating the variance, selecting the sample size.
- Read pp. 315-345.
- VII. Hypothesis Testing: Basic ideas, testing the mean, one-tail and two-tail tests, p-values, t-tests, inference about a population proportion, inference about a population variance.
- Read Ch. 9
- VIII. Comparing Two Populations: Comparing two means, comparing two variances.
- Read pp. 403-425.
- IX. Analysis of Variance: One way ANOVA, ANOVA models, randomized blocks, two factor ANOVA.
- Read pp. 449-480.
- X. Correlation and Linear Regression Analysis: Correlation, bivariate regression, inference,  $R^2$ , prediction.
- Read pp. 499-538, 543-547.
- XI. Multiple Regression: The multiple regression equation, inference, qualitative independent variables, non-linear regressors, interaction among regressors.
- Read pp. 561-584.
- XII. Time Series Analysis: Trend, cyclic, and seasonal variation; trend forecasting; moving averages, exponential smoothing, seasonality.
- Read pp. 609-641.
- XIII. Chi Square Tests: Independence, goodness of fit.
- Read pp. 661-676, 683-687.

- XIV. Nonparametric Methods: Runs test, Wilcoxon signed-rank test, Mann-Whitney test, Kruskal-Wallis test, Spearman Rank Correlation test.

Read Chapter 16.

- XV. Statistical Quality Control: Control charts, process capability; out-of-control processes, attribute charts.

Read Chapter 17.