

- 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 are for study purposes and will not be graded. 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.

Computer Assignments: There will be four computer projects assigned during the term. The four assignments will account for 25% of the student's grade.

Exams: There will be three exams during the term. They will take place on the following dates:

Exam I	Wednesday, February 8
Exam II	Wednesday, March 14
Exam III	Wednesday, April 25 (8:00-11:00 a.m.)

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 not acceptable. If you do miss an exam, then you will need to provide third-party documentation of the reason for your absence. 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. 82-83 of the Undergraduate Catalog. 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. 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:

Assessment	Dates	Weight
Exam I	February 8	25%
Exam II	March 14	25%
Exam III	April 25	25%
Computer Assignments	As assigned	25%

Text: *Applied Statistics in Business and Economics*, 3rd edition, by David P. Doane and Lori E. Seward, 2011. 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. 23-34, 59-89, 113-152.
- 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. 215-231, 244-246.
- IV. Continuous Probability Distributions: Uniform distribution, normal distribution, standard normal distribution, normal probabilities.
Read pp. 255-276.
- V. Sampling Distributions: Central Limit Theorem, sampling distribution of \bar{X} , properties of estimators.
Read pp. 295-306.
- VI. Estimation: Point versus interval estimators, estimating the mean, Student's t distribution, estimating the population proportion, estimating the variance, selecting the sample size.
Read pp. 307-333.

- 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. Two Sample Inference: Two sample hypothesis tests, two sample confidence intervals, paired means comparison.
- Read pp. 391-416.
- IX. Analysis of Variance: One way ANOVA, ANOVA models, randomized blocks, two factor ANOVA.
- Read pp. 439-473.
- X. Correlation and Linear Regression Analysis: Correlation, bivariate regression, inference, R^2 , prediction.
- Read Ch. 12.
- XI. Multiple Regression: The multiple regression equation, inference, qualitative independent variables, non-linear regressors, interaction among regressors.
- Read pp. 545-571.
- XII. Time Series Analysis: Trend, cyclic, and seasonal variation; trend forecasting; moving averages, exponential smoothing, seasonality.
- Read pp. 595-627.
- XIII. Chi Square Tests: Independence, goodness of fit.
- Read pp. 643-659, 665-670.
- 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 pp. 715-743.