

STAT 244: Statistics  
(Adopted - Fall 2017)

**Catalog Description:** Summarizing data, including distributions, change and growth, relationships. Basics of survey design and experimental design. Inferential statistics, including confidence intervals and hypothesis testing. Credit may not be granted for both STAT 107 and STAT 244. Prerequisite: MATH 120.

**Textbook:** Introduction to Statistics and Data Analysis by Peck, Olsen and Devore, Cengage Pub, 5th Ed. with WebAssign

WebAssign Homework Available – <https://goo.gl/YDxm4g>

**Course Outline and Topics**

- Chapter 2: Collecting Data Sensibly
  - 2.1: Statistical Studies: Observation and Experimentation.
  - 2.2: Sampling.
  - 2.3: Simple Comparative Experiments.
  - 2.4: More on Experimental Design.
  - 2.5: Interpreting and Communicating the Results of Statistical Analyses. \*
  
- Chapter 3: Graphical Methods for Describing Data (Laboratory) \*\*
  
- Chapter 4: Numerical Methods for Describing Data
  - 4.1: Describing the Center of a Data Set.
  - 4.2: Describing Variability in a Data Set.
  - 4.3: Summarizing a Data Set: Boxplots.
  - 4.5: Interpreting and Communicating the Results of Statistical Analyses. \*
  
- Chapter 5: Summarizing Bivariate Data
  - 5.1 Correlation
  - 5.2 Linear Regression: Fitting a Line to Bivariate Data
  - 5.3 Assessing the Fit of a Line
  
- Chapter 6: Probability
  - 6.1: Chance Experiments and Events.
  - 6.2: Definition of Probability.
  - 6.3: Basic Properties of Probability
  - 6.4: Conditional Probability.
  - 6.5: Independence
  
- Chapter 7: Random Variables and Probability Distributions
  - 7.1: Random Variables.
  - 7.2: Probability Distributions for Discrete Random Variables.
  - 7.3: Probability Distributions for Continuous Random Variables.

- 7.4: Mean and Standard Deviation of a Random Variable. \*\*\*
- 7.6: Normal Distributions.
- 7.7: Checking for Normality and Normalizing Transformations (Laboratory) \*\*
- 7.8: Using the Normal Distribution to Approximate a Discrete Distribution \*
  
- Chapter 8: Sampling Variability and Sampling Distributions
  - 8.1: Statistics and Sampling Variability.
  - 8.2: The Sampling Distribution of a Sample Mean.
  - 8.3: The Sampling Distribution of a Sample Proportion.
  
- Chapter 9: Estimation Using a Single Sample
  - 9.1: Point Estimation
  - 9.2: Large-Sample Confidence Interval for a Population Proportion.
  - 9.3: Confidence Interval for a Population Mean.
  - 9.4: Interpreting and Communicating the Results of Statistical Analyses. \*
  
- Chapter 10: Hypothesis Testing Using a Single Sample
  - 10.1: Hypotheses and Test Procedures.
  - 10.2: Errors in Hypothesis Testing.
  - 10.3: Large-Sample Hypothesis Tests for a Population Proportion.
  - 10.4: Hypothesis Tests for a Population Mean.
  - 10.5: Power and Probability of Type II Error. \*
  - 10.6: Interpreting and Communicating the Results of Statistical Analyses. \*
  
- Chapter 11: Comparing Two Populations or Treatments
  - 11.1: Inferences Concerning the Difference Between Two Population or Treatment Means Using Independent Samples.
  - 11.2: Inferences Concerning the Difference Between Two Population or Treatment Means Using Paired Samples.
  - 11.3: Large-Sample Inferences Concerning the Difference Between Two Population or Treatment Proportions.
  - 11.4: Interpreting and Communicating the Results of Statistical Analyses. \*
  
- Chapter 13: Simple Linear Regression and Correlation: Inferential Methods
  - 13.1: Simple Linear Regression Model.
  - 13.2: Inferences about the Slope of the Population Regression Line.
  - 13.3: Checking Model Adequacy. \*\*
  
- Chapter 15: Analysis of Variance
  - 15.1: Single-Factor ANOVA and the F Test.
  - 15.2: Multiple Comparisons. \*

\* Optional topic

\*\* Covered in laboratory tutorials and exercises.

\*\*\* Do not cover Mean and Variance of Linear Functions and Linear Combinations

**Any instructor should cover all of the material specified, except the starred (\*) sections which are optional.**

**Weekly Computer Laboratory (50 minutes of hands-on tutorials/exercises)**

Laboratory tutorials and exercises will be distributed online and/or through Blackboard.

Major Parts

- I. Data Cleaning and Preparation
- II. Data Summary and Visualization
- III. Data Analysis, Modelling and Inference

**Course objectives:**

After the completion of Stat 244, students will be able to

- use technology to understand, summarize, and analyze data
- understand and perform basic statistical inference such as confidence intervals, hypothesis testing, regression, and analysis of variance.
- organize and represent data, recognize and describe relationships, and perform basic statistical inference using a statistical software such as Minitab, R, etc.
- understand the role of randomness and sampling distributions in statistical applications.
- basic probability concepts including random experiments, sample spaces and events, random variables, and normal distribution.