

Fariborz Maseeh Department of Mathematics and Statistics

STAT 243: Introduction to Probability and Statistics I

Updated Fall 2019

Course Description: A basic course in statistical analysis including presentation of data, descriptive statistics, probability, probability distributions, sampling distributions, estimation, and use of statistical computer packages. A broad nontechnical survey designed primarily for non-math students who need to utilize the subject in their own fields. Not approved for major credit. This is the first course in a sequence of two: Stat 243 and Stat 244 which must be taken in sequence.

Credits: 4

Prerequisites: Completion of MTH 95 with a grade of C- or above within the last year, or passing at the necessary level on the mathematics placement test within the last year (<https://www.pdx.edu/math/placement>).

Course Objectives:

1. Gain proficiency in creating and interpreting qualitative and quantitative data using SPSS or similar software.
2. Understand the basic concepts of probability and probability distributions.
3. Conduct inferential techniques on a single parameter.

Student Learning Outcomes: Upon completion of this course the student should be able to:

- Apply probability and basic descriptive statistics to real world problems.
- Communicate information effectively and efficiently.
- Use graphing calculators and/or SPSS as a computational and graphical tool.
- Select theoretical concepts from various disciplines and apply them to real world problems.

Topics:

1. Overview of Statistical Applications and Descriptive Statistics
2. Probability
3. Random Variables and Probability Distributions
4. Binomial Distributions
5. Normal Distributions
6. Sampling Distributions and the Central Limit Theorem
7. Estimation and Confidence Intervals for One Population
8. Hypothesis Testing for One Population

Suggested Textbooks:

Alan Agresti, Christine A. Franklin, Bernhard Klingenberg, *Statistics: The Art and Science of Learning from Data*, Pearson, 4th edition.

Suggested Calculator: TI-83, TI-84 or TI-89

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Current STAT 243 Textbook Mapping:

Alan Agresti, Christine A. Franklin, Bernhard Klingenberg, Statistics: The Art and Science of Learning from Data, Pearson, 4th edition.

The course uses the online homework system MyStatLab from Pearson.

Suggested Calculator: TI-83, TI-84 or TI-89

Chapter 2: Exploring Data with Graphs and Numerical Summaries

- 2.1 Different Types of Data
- 2.2 Graphical Summaries of Data
- 2.3 Measuring the Center of Quantitative Data
- 2.4 Measuring the Variability of Quantitative Data
- 2.5 Using Measures of Position to Describe Variability
- 2.6 Recognizing and Avoiding Misuses of Graphical Summaries (briefly)

Chapter 5: Probability in our Daily Lives

- 5.1 How Probability Quantifies Randomness
- 5.2 Finding Probabilities
- 5.3 Conditional Probability
- 5.4 Applying the Probability Rules

Chapter 6: Probability Distributions

- 6.1 Summarizing Possible Outcomes and Their Probabilities
- 6.2 Probabilities for Bell-Shaped Distributions
- 6.3 Probabilities When Each Observation Has Two Possible Outcomes

Chapter 7: Sampling Distributions

- 7.1 How Sample Proportions Vary Around the Population Proportion
- 7.2 How Sample Means Vary Around the Population Mean

Chapter 8: Statistical Inference: Confidence Intervals

- 8.1 Point and Interval Estimates of Population Parameters
- 8.2 Constructing a Confidence Interval to Estimate a Population Proportion
- 8.3 Constructing a Confidence Interval to Estimate a Population Mean
- 8.4 Choosing the Sample Size for a Study
- 8.5 Using Computers to Make New Estimation Methods Possible (optional)

Chapter 9: Statistical Inference: Significance Tests About Hypotheses

- 9.1 Steps for Performing a Significance Test
- 9.2 Significance Tests About Proportions
- 9.3 Significance Tests About Means
- 9.4 Decisions and Types of Errors in Significance Tests
- 9.5 Limitations of Significance Tests
- 9.6 The Likelihood of a Type II Error and the Power of a Test