

# Unit 2 Outline

## Unit 2: Probability Topics

*After you have learned to describe and display data, how can you use the sample data to draw conclusions about the populations? To answer this question, you need probability, a subject we will explore over the course of this unit.*

*If you open a newspaper, you are likely to read headlines like: “Should risky medical procedures be allowed?”; “30% chance of a hurricane this weekend”; “Analysts expect the gas prices to increase this summer”; and “Two brothers meet by accident after being separate for more than 20 years.” All of these topics deal with everyday life and all of them have to do with probability.*

*The world seems to be full of apparently unpredictable events. Probability theory is a tool that was created to deal with such events more effectively. For example, before getting a surgery, patients want to know the probability that the surgery might fail; before taking medication, we want to know the probability that there will be side effects; before leaving the house, we want to know the probability that it will rain today. Probability deals with the likelihood of an event occurring. It is a measure that takes on values between 0 and 1, inclusive, with 0 representing impossible events and 1 representing certainty. The ability to calculate probability allows us to make better decisions.*

*Probabilities affect our everyday lives. In this unit you will learn what probability and its properties are, how probability behaves, and how to calculate and use it. You will study the fundamentals of probability and will work through examples that cover different types of probability problems. These basic probability concepts will provide a foundation for understanding more statistical concepts. You probably already (intuitively) use concepts from probability, but this unit will help you formally and precisely predict the likelihood of an event occurring given certain constraints.*

*Whether you are evaluating how likely it is to get more than 50% of the questions correct on a quiz if you guess randomly; predicting the likelihood that the next storm will arrive by the end of the week; or exploring the relationship between the number of hours students spend at the gym and their performance on an exam, an understanding of the fundamentals of probability is crucial. Make sure you spend time on this unit. Your goal will be to become comfortable with the basic machinery of probability theory and its applications.*

### **Sections:**

**2.1** Probability Overview

**2.2** Independent and Mutually Exclusive Events

**2.3** Two Basic Rules of Probability

**2.4** Contingency Tables, Venn Diagrams, and Tree Diagrams

## **2.1 Probability Overview**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 3: Probability Topics: "Section 1: Probability Topics" and "Section 2: Terminology"

### **2.1.1 Probability Topics**

*Note: This topic is covered by the reading assigned in subunit 2.1. In particular, please focus on the Section 1 reading of Illowsky and Dean's Collaborative Statistics.*

### **2.1.2 Probability Terminology**

*Note: This topic is covered by the reading assigned in subunit 2.1. In particular, please focus on the Section 2 reading of Illowsky and Dean's Collaborative Statistics.*

## **2.2 Independent and Mutually Exclusive Events**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 3: Probability Topics: "Section 3: Independent and Mutually Exclusive Events"

## **2.3 Two Basic Rules of Probability**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 3: Probability Topics: "Section 4: Two Basic Rules of Probability"

### **2.3.1 The Multiplication Rule**

*Note: This topic is covered by the reading assigned in subunit 2.3. Focus on the explanation of the multiplication rule as well as the examples and sample problems provided.*

### **2.3.2 The Addition Rule**

*Note: This topic is covered by the reading assigned in subunit 2.3. Focus on the explanation of the multiplication rule as well as the examples and sample problems provided.*

## **2.4 Contingency Tables, Venn Diagrams, and Tree Diagrams**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 3: Probability Topics: "Section 5: Contingency Tables," "Section 6: Venn Diagrams," and "Section 7: Tree Diagrams"
- Lecture: Barbara Illowsky and Susan Dean's Collaborative Statistics: "Video Lecture 3: Probability Topics"
- Assessment: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 3: Probability Topics: "Practice 1: Contingency Tables" and "Practice 2: Calculating Probabilities"