

# Unit 6 Outline

## Unit 6: Correlation, Regression, and ANOVA

*One of the main reasons you will conduct analysis is in order to understand how two variables are related to one another. The most common type of relationship is a linear relationship. For example, you may want to know what happens to one variable when you increase or decrease the other variable. You want to answer questions such as, “Does one increase as the other increases, or does it decrease?” For example, how does drinking soda relate to weight gain for teenagers? Does drinking more soda really relate to more weight gain? In this unit, you will learn to measure the degree of a relationship between two or more variables. Both correlation and regression are measures for comparing variables. However, they are quite different from one another. Correlation quantifies the strength of a relationship between two variables and is a measure of existing data. Regression, on the other hand, is the study of the strength of a linear relationship between an independent and dependent variable, and can be used to **predict** the value of the dependent variable when the value of the independent variable is unknown. A note of caution: Be careful to not automatically interpret correlation and regression as establishing cause-and-effect relationships!*

*Also, you will learn about a method called Analysis of Variance (abbreviated ANOVA), which is used for hypothesis tests involving more than two averages. ANOVA is about examining the amount of variability in the Y variable and trying to see where that variability is coming from. You will study the simplest form of ANOVA, called single factor or one-way ANOVA. Finally, you will briefly study the F-distribution, used for ANOVA, and the test of two variances.*

### **Sections:**

**6.1** Linear Regression

**6.2** Correlation

**6.3** F-Distribution and ANOVA

**Final Exam**

*Note: The final exam for this course is only available through [saylor.org](http://www.saylor.org). It can be found at <http://www.saylor.org/courses/ma121/> and the exam can be completed by creating a free account with [saylor.org](http://www.saylor.org).*

## **6.1 Linear Regression**

### **6.1.1 Linear Equations, Slope, and Y-intercept**

- Reading: Barbara Illowsky and Susan Dean’s Collaborative Statistics: Chapter 12: Linear Regression and Correlation: “Section 1: Linear Regression and Correlation,” “Section 2: Linear Equations,” and “Section 3: Slope and Y-Intercept of a Linear Equation”

### **6.1.2 Scatter Plots**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 12: Linear Regression and Correlation: "Section 4: Scatter Plots"

### **6.1.3 The Regression Equation**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 12: Linear Regression and Correlation: "Section 5: The Regression Equation"
- Lecture: Khan Academy's Statistics: "Covariance and the Regression Line"

## **6.2 Correlation**

### **6.2.1 The Correlation Coefficient**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 12: Linear Regression and Correlation: "Section 6: The Correlation Coefficient"
- Lecture: Khan Academy's Statistics: "Correlation and Causality"

### **6.2.2 Prediction**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 12: Linear Regression and Correlation: "Section 8: Prediction"

### **6.2.3 Outliers**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 12: Linear Regression and Correlation: "Section 9: Outliers"
- Lecture: Barbara Illowsky and Susan Dean's Collaborative Statistics: "Video Lecture 12: Linear Regression and Correlation"
- Assessment: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 12: Linear Regression and Correlation "Practice: Linear Regression"

## **6.3 F-Distribution and ANOVA**

### **6.3.1 ANOVA**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 13: F Distribution and ANOVA: "Section 1: F Distribution and ANOVA" and "Section 2: ANOVA"

### **6.3.2 The F Distribution and the F Ratio**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 13: F Distribution and ANOVA: "Section 3: The F Distribution and the F Ratio" and "Section 4: Facts about the F Distribution"
- Lecture: Khan Academy's Statistics: "ANOVA 1: Calculating SST (Total Sum of Squares)," "ANOVA 2: Calculating SSW and SSB (Total Sum of Squares Within and Between)," and "ANOVA 3: Hypothesis Test with F-Statistic"

### **6.3.3 Test of Two Variances**

- Reading: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 13: F Distribution and ANOVA: "Section 5: Test of Two Variances"
- Assessment: Barbara Illowsky and Susan Dean's Collaborative Statistics: Chapter 13: F Distribution and ANOVA: "Practice: ANOVA"

## **Final Exam**

- Final Exam: The Saylor Foundation's MA121 Final Exam