



# COURSE SYLLABUS

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## Table of Contents

<b><u>Section 1: Course Information</u></b>	2
<u>Course Description</u>	2
<u>Course Overview</u>	3
<u>Course Workload</u>	3
<u>Course Materials</u>	3-4
<u>Course Topics</u>	5
<u>Intended Learning Outcomes</u>	5-6
<u>Late Work</u>	6-7
<u>Extra Credit</u>	7
<b><u>Section 2: Southeastern Policies</u></b>	8
<b><u>Section 3: Course Schedule</u></b>	9
<u>Aim, Learn, and Apply Descriptions</u>	9
<u>Course Schedule</u>	10-26
<b><u>Section 4: Assessments</u></b>	27-28

## SECTION 1: COURSE INFORMATION

**Format:** Eight weeks.

**Course ID:** MATH 2023

**Course Title:** Introduction to Probability and Statistics

**College:** College of Unrestricted Education

**Prerequisites:** Recommended minimum math score on ACT of 21 or SAT of 490.

**Credit Hours:** 3

**Instructor:** See the online course in MyFIRE for instructor contact information and availability.

### Course Description

This course is an introduction to the concepts and methods of probability and statistics. The course is designed for students interested in the application of probability and statistics in business and other social sciences. Topics include descriptive statistics, probability theory, random variables and probability distributions, sampling distributions, estimating population parameters, testing hypotheses about population parameters, correlation and regression, and analysis of variances

## **Course Overview**

As members of a society increasingly devoted to the use (and misuse) of numbers, students must learn to correctly interpret statistical presentations in advertising and in their major fields. This course is designed to give the students a working knowledge of the topics listed above with an emphasis on the application of statistical principles rather than just the theory. Students will need to apply what they learn to a variety of real-life scenarios.

## **Course Workload**

Time spent on course assignments will vary by student depending on familiarity with course content, reading rate of speed, writing rate of speed, and other individual factors. Based on averages for most students, it is estimated that the course workload estimate for this course is 8.5 hours per week.

## **Course Materials**

This course is utilizing Follett Access®, a new and convenient program designed to ensure every student has the course materials they need to succeed. When you register for this course, the required course materials will be ordered for you, and the cost of the materials will be applied to your student account as a course fee. This feature enables you to identify the full cost of your course upfront with no surprises of additional out of pocket expenses for required course materials. Once you are registered in the Student Information System (JICS) and you gain access to the course, you will automatically have access to the required course materials.

If you have questions about the cost of your course materials, please access your financial statement through the Student Information System (JICS). The cost will be listed as a course material(s) fee.

Grades: Grades that appear in Pearson are not reflective of course grades; course grades will appear in MyFIRE only.

Required and optional textbooks are accessed and ordered through [SEU's bookstore](#).

**Disclaimer:** The resources utilized in this course provide information, thoughts and insights that should encourage critical thinking on the part of the student. Please note as well that as an Assembly of God institution, Southeastern University does not necessarily endorse specific personal, religious, philosophical, or political positions found in these resources.

## Course Topics

**The purpose of this course is to introduce, reinforce, and measure learning on the following topics:**

1. Exploring and Graphing Data
2. Describing, Summarizing and Comparing Data.
3. Probability
4. Normal Probability Distribution
5. Estimates and Sample Size
6. Hypothesis Testing
7. Correlation, Regression, Goodness-of-fit and Contingency Tables

## Intended Learning Outcomes

**As a result of reading, study, and assessments in this course, the student should be able to:**

1. Summarize data graphically by displaying data using methods from two variables descriptive statistics, find measures of central tendency and measure of variation for data sets.
2. Construct a histogram for a given set of data. This can be done by hand or with a graphing calculator.
3. Find simple probabilities and probabilities of compound events.
4. Standardize a normally distributed random variable, use normal distribution tables to find probabilities for normally distributed random variables and the t-distribution, use the Central Limit Theorem to find probabilities for sampling distributions.
5. Construct and interpret confidence intervals.
6. Construct a hypothesis test based on a given claim and draw an appropriate conclusion.
7. Find linear least-squares regression equations for appropriate data sets, graph least-square regression equations on the scatter plot for the data sets

and find and apply the coefficient of correlation.

8. Use the chi-square distribution to test independence and to test goodness of fit.
9. Use appropriate statistical techniques to analyze and interpret applications based on data related to business, social sciences, psychology, life sciences, health sciences or education, and interpret results using technology-based statistical analysis.

## **Late Work**

**Work ahead:** For planned events (mission trips, vacations, surgeries) you are invited to work ahead in order to submit work by the due date. No permission is needed.

**Request an extension:** If you know you will not be able to turn work in on time, contact your professor at least 24 hours before the assignment is due. Let the professor know about your circumstances and when you can turn the work in. If the professor decides to grant you an extension and you get the work in when you say you will, there will not be a penalty. You should only request an extension when something unforeseen comes up that you have no control over; a professor has no obligation to grant an extension and will be less inclined to do so if you are asking for one every week.

**Late work:** without prior arrangements, late work\* submitted within one week of the original due date will be considered for partial credit. Work will ONLY be accepted for the first seven days after it is due. NO WORK will be accepted past the last day of the course.

\*Discussion Posts: late participation in discussion forums is not accepted for late credit. The purpose of the discussion forum is to engage with your classmates on substantive ideas related to the course material, and your classmates will not revisit forums past the due dates. Similarly, professors will not revisit forums to grade past discussion due dates.

Professors of Foundational Core courses have been instructed to follow this policy to ensure fairness across all FC classes. Your professor will work with

you if true emergencies occur, but your busy schedule will not be considered an emergency. If you have travel, a vacation, a wedding, or any other plannable event, it is up to you to communicate with your instructor to avoid grade penalties.

### **Extra Credit**

No extra credit accepted.

## **SECTION 2: SOUTHEASTERN POLICIES**

### Academic Policies

View this link to see Southeastern's Policies regarding SEU's Mission and Vision Statements, Title IX Statement, Student Services, Class Participation, Official Email, MyFIRE Use, Technical Difficulties, Technical Support, Disability Statement, Academic Honesty, Course Evaluation, Official Withdrawal, Grading Scale, and Netiquette.

## SECTION 3: COURSE SCHEDULE

The **Course Schedule** provides a listing of your work in this course. The assessments are listed by Module and include the due dates and point values.

**Note:** Assignments are due by 11:59 p.m. EST on the due date, unless otherwise noted.

### AIM, LEARN, AND APPLY DESCRIPTIONS

#### Aim



When you see the Aim icon, you will be introduced to topics and ideas that will be covered throughout this module. The AIM will also provide you with a glimpse into your learning objectives and an introduction to this module.

#### Learn



When you see the Learn icon, all of your reading assignments will be listed and may include additional resources that your instructor is providing to help you complete the activities and assessments for the module.

#### Apply



When you see the Apply Icon, it will be time to demonstrate your learning for the module. The items here are those in which you'll be graded and may include discussions, activities, assignments, quizzes, exams, and projects.

**MODULE 1**

**XX/XX/XX – XX/XX/XX**



- Analyze sample data relative to context, source, and sampling method.
- Understand the difference between statistical significance and practical significance.
- Distinguish between a parameter and statistic, quantitative data and qualitative data, and discrete and continuous data.
- Define and identify random sample, simple random sample, voluntary response sample.
- Develop an ability to summarize data in the format of a frequency distribution and relative frequency distribution.
- Develop the ability to picture the distribution data in the format of a histogram and examine it to identify common distributions, including uniform and normal distributions.
- Develop an ability to graph data using a dotplot, stemplot, time-series graph, Pareto chart, pie chart, and frequency polygon.



- Chapter 1: Sections 1 - 3
- Chapter 2: Sections 1 – 3
- Video: Module 1 Overview
- Video: Starting StatCrunch
- Video: Overview of StatCrunch
- Video: How to Create a Frequency Table

- Video: How to Create a Histogram



- Pretest
  - ILOs: 1-9
  - Due: Tuesday
  - Points: 24
- Section 1-1. Statistical and Critical Thinking
  - ILOs: 1 ,2, and 9
  - Due: Tuesday
  - Points: 15
- Section 1-2. Types of Data
  - ILOs: 1, 2 and 9
  - Due: Tuesday
  - Points: 15
- Section 1-3. Collecting Sample Data
  - ILOs: 1 and 2
  - Due: Tuesday
  - Points: 9
- Section 2-1. Frequency Distributions
  - ILOs: 1, 2, and 9
  - Due: Tuesday
  - Points: 10
- Section 2-2. Histograms
  - ILOs: 1, 2, and 9

- Due: Tuesday
- Points: 12
- Section 2-3. Graphs that Enlighten and Deceive
  - ILOs: 1, 2 and 9
  - Due: Tuesday
  - Points: 14
- Test 1: Chapters 1 and 2
  - ILOs:1, 2, and 9
  - Due: Tuesday
  - Points: 15

**MODULE 2:  
XX/XX/XX – XX/XX/XX**



- Develop the ability to measure the center of data by finding the mean, median, mode, and range.
- Determine the effect of outliers on the mean and median.
- Develop the ability to measure variation by finding the values of range, variance, and standard deviation. Interpret values of standard deviation using range rule of thumb.
- Develop the ability to compute the z score, percentile values, and quartile values of data.
- Develop the ability to construct a boxplot from a set of data.



- Chapter 3: Sections 1 – 3
- Video: Module 2 Overview
- Video: How to Calculate Summary Statistics
- Video: How to Draw Box Plots



- Module 2 Discussion Forum
  - ILOs: 1 and 2
  - Due: Saturday (initial post); Tuesday (response posts)

- Points: 25
- Section 3-1. Measure of Center
  - ILOs: 1 and 9
  - Due: Tuesday
  - Points: 15
- Section 3-2. Measure of Variation
  - ILOs: 1 and 9
  - Due: Tuesday
  - Points: 15
- Section 3-3. Measure of Relative standing and Boxplot
  - ILOs: 1 and 9
  - Due: Tuesday
  - Points: 15
- Test 2: Chapters 3
  - ILOs: 1 and 9
  - Due: Tuesday
  - Points: 12

**MODULE 3:**  
**XX/XX/XX – XX/XX/XX**



- Develop the ability to calculate probabilities of events.
- Define the complement and calculate its probability.
- Distinguish between independent and dependent events.
- Develop ability to calculate probabilities using the addition, multiplication and complement rules.
- Compute the probability of “at least one” occurrence of an event.
- Define random variable and probability distribution.
- Determine when a potential probability distribution actually satisfies the necessary requirement.



- Chapter 4: Sections 1 – 3
- Chapter 5: Section 1
- Video: Module 3 Overview



- Section 4-1. Basic Concepts of Probability
  - ILOs: 3 and 9
  - Due: Tuesday
  - Points: 15
- Section 4-2. Addition Rule and Multiplication Rule

- ILOs: 3 and 9
- Due: Tuesday
- Points: 15
- Section 4-3. Complements, Conditional Probability & Bayes' Theorem
  - ILOs: 3 and 9
  - Due: Tuesday
  - Points: 14
- Section 5-1. Probability Distribution
  - ILOs: 3 and 9
  - Due: Tuesday
  - Points: 12
- Test 3: Chapters 4 and 5.1
  - ILOs: 3 and 9
  - Due: Tuesday
  - Points: 15

**MODULE 4:  
XX/XX/XX – XX/XX/XX**



- Describe the Characteristic of standard normal distribution.
- Find the probability of some z values in a standard normal distribution.
- Develop the ability to describe a normal distribution (not necessarily a standard normal distribution).
- Find Z and X scores corresponding to regions under the curve representing a normal distribution.
- Describe and apply the central theorem by finding the probability that a sample mean falls within some specified range of values.



- Chapter 6: Sections 1 – 4
- Video: Module 4 Overview
- Video: How to find Probabilities and Scores



- Module 4 Discussion Forum
  - ILOs: 4
  - Due: Saturday (initial post); Tuesday (response posts)
  - Points: 25
- Section 6-1. The Standard Normal Distribution

- ILOs: 4 and 9
  - Due: Tuesday
  - Points: 15
- Section 6-2. Real Applications of Normal Distribution
  - ILOs: 4 and 9
  - Due: Tuesday
  - Points: 15
- Section 6-3. Sampling distributions and estimates
  - ILOs: 4 and 9
  - Due: Tuesday
  - Points: 8
- Section 6-4. The Central Limit Theorem
  - ILOs: 4 and 9
  - Due: Tuesday
  - Points: 11
- Test 4: Chapter 6
  - ILOs: 4 and 9
  - Due: Tuesday
  - Points: 12

**MODULE 5:**  
**XX/XX/XX – XX/XX/XX**



- Construct a confidence interval estimate of a population proportion and a population mean; and interpret such confidence intervals.
- Identify the requirements necessary for the procedure that is used, and determine whether those requirements are satisfied.
- Develop the ability to determine the sample size necessary to estimate a population proportion.
- Determine the sample size necessary to estimate a population mean.



- Chapter 7: Sections 1 – 2
- Presentation: Finding Critical Values
- Video: How to Estimate a Population Proportion from Raw Data
- Video: How to Estimate a Population Proportion from Summary Data
- Video: How to Estimate a Population Mean from Raw Data
- Video: How to Estimate a Population Mean from Summary Data
- Video: How to find sample Size using StatCrunch



- Section 7-1. Estimating a Population Proportion
  - ILOs: 5 and 9
  - Due: Tuesday
  - Points: 14

- Section 7-2. Estimating Population Mean

- ILOs: 5 and 9
- Due: Tuesday
- Points: 15

- Test 5: Chapter 7

- ILOs: 5 and 9
- Due: Tuesday
- Points: 15

**MODULE 6:  
XX/XX/XX – XX/XX/XX**



- Develop the ability to identify the null and alternative hypotheses when given some claim about a population parameter (such as proportion, or mean, or variance).
- Develop the ability to calculate a test statistic, find critical values, calculate P-values, and state a final conclusion that addresses the original claim.
- Develop the ability to use sample data to conduct formal hypothesis test of a claim about population proportion.
- Develop the ability to use sample data to conduct formal hypothesis test of a claim about population mean.



- Chapter 8: Sections 1 – 3
- Video: How to Test a Claim about a Population Proportion Using Raw Data
- Video: How to Test a Claim about a Population Proportion Using Summary Data
- Video: How to Test a Claim about a Population Mean Using Raw Data
- Video: How to Test a Claim about a Population Mean Using Summary Data



- Module 6 Discussion Forum
  - ILOs: 5 and 9
  - Due: Saturday (initial post); Tuesday (response posts)

- Points: 25
- Section 8-1. Basics of Hypothesis Testing
  - ILOs: 6 and 9
  - Due: Tuesday
  - Points: 13
- Section 8-2. Testing Claim About a Proportion
  - ILOs: 6 and 9
  - Due: Tuesday
  - Points: 14
- Section 8-3. Testing Claim About Mean
  - ILOs: 6 and 9
  - Due: Tuesday
  - Points: 15
- Test 6: Chapter 8
  - ILOs: 6 and 9
  - Due: Tuesday
  - Points: 12

**MODULE 7:**  
**XX/XX/XX – XX/XX/XX**



- Use paired data to find the value of the linear correlation coefficient,  $r$ , and the equation of the regression line.
- Determine whether there is sufficient evidence to support a conclusion that there is a linear correlation between two variables.
- Find the best predicted value of a variable given the value of some other variable.
- Use frequency counts of categorical data portioned into different categories and determine whether the data fit some claimed distribution.
- Use categorical data summarized as frequencies in a two-way table with at least two rows and at least two columns to conduct a formal test of independence between the row variable and column variable.



- Chapter 10: Sections 1 and 2
- Chapter 11: Sections 1 and 2
- Video: How to Find the Correlation Between Variables
- Video: How to Compute the Linear Regression between Variables
- Video: How to Create a Contingency Table Using Raw Data
- Video: How to Create a Contingency Table Using Summary Data
- Video: Performing Goodness-of-fit Testing



- Section 10-1. Correlation

- ILOs: 7, 8 and 9
- Due: Tuesday
- Points: 15
- Section 10-2. Regression
  - ILOs: 7, 8 and 9
  - Due: Tuesday
  - Points: 15
- Section 11-1. Goodness-of-fit
  - ILOs: 7, 8 and 9
  - Due: Tuesday
  - Points: 10
- Section 11-2. Contingency Table
  - ILOs: 7, 8 and 9
  - Due: Tuesday
  - Points: 11
- Test 7: Chapters 10 (10.1, 10.2) and 11(11.1,11.2)
  - ILOs: 7, 8 and 9
  - Due: Tuesday
  - Points: 15

**MODULE 8:**  
**XX/XX/XX – XX/XX/XX**



- Summarize data graphically by displaying data using methods from two variables descriptive statistics, find measures of central tendency and measure of variation for data sets.
- Construct a histogram for a given set of data. This can be done by hand or with a graphing calculator.
- Find simple probabilities and probabilities of compound events.
- Standardize a normally distributed random variable, use normal distribution tables to find probabilities for normally distributed random variables and the t-distribution, use the Central Limit Theorem to find probabilities for sampling distributions.
- Construct and interpret confidence intervals
- Construct a hypothesis test based on a given claim and draw an appropriate conclusion.
- Find linear least-squares regression equations for appropriate data sets, graph least-square regression equations on the scatter plot for the data sets and find and apply the coefficient of correlation.
- Use the chi-square distribution to test independence and to test goodness of fit.
- Use appropriate statistical technique to analyze and interpret applications based on data related to business, social sciences, psychology, life sciences, health sciences or education, and interpret results using technology-based statistical analysis.



- Review Chapters 1, 2, 3, 4, 5.2, 6, 7, 8, 10.1, 10.2, 11.1, and 11.2.



- Module 8 Discussion Forum
  - ILOs: 6 and 9
  - Due: Saturday (initial post); Tuesday (response posts)
  - Points: 25
- Final Exam
  - ILOs: 1-9
  - Due: Tuesday
  - Points: 25

## **SECTION 4: ASSESSMENTS**

### **Homework and Textbook Practice**

#### **Description**

The homework assignments are meant for practice. They are important in reinforcing the concepts covered in each section.

#### **Total Possible Points**

347

#### **Grade Weight**

20%

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### **Exams**

#### **Description**

Each content week concludes with a test covering the material reviewed that week. The last week includes a final exam that evaluates the material reviewed throughout the whole term.

#### **Total Possible Points**

145

#### **Grade Weight**

65%

## SECTION 4: ASSESSMENTS

### Discussion Forums

#### Description

There is a discussion forum in each alternate week of the course. The discussion is a practical application that makes use of the concepts being reviewed each week.

#### Total Possible Points

100

#### Grade Weight

15%

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