STAT 1222 Introduction to Statistics

Course Outline

Course Overview

Credit Hours: (3)

This is a non-calculus based course on the introductory topics of statistics beginning with descriptive statistics and going through one-sample hypothesis testing. Topics will include an introduction to data summarization, discrete and continuous random variables (e.g., binomial, normal), sampling distribution, central limit theorem, estimation, and testing hypotheses. Special emphasis will be placed on applications to the social and behavioral sciences. **This course may NOT be taken for credit if credit has been received for STAT 1220 or STAT 1221.**

This course will be taught using active learning techniques, Poll Everywhere questions, and group activities to keep students engaged and provide immediate feedback while learning in class as well as allowing students to work together to deepen their understanding of course concepts. Students will participate via in-class activities, Canvas assignments, RealizeIt pre-class assignments, projects, tests, and a final exam.

Prerequisites: Appropriate eligibility level of math placement or placement by the department.

Course Objectives: To be able to describe, infer, interpret, and communicate statistical concepts and values in the context of real-world problems. By the end of the course, students should be able to:
- Use appropriate technology to describe important characteristics of a data set,
- Infer appropriate information from sample data,
- Interpret their results, and
- Communicate their results.

Required Materials

1) Technical Equipment:
> Laptop computer with Windows 10, 8, or 7 / Mac OS X 10.10 or higher
> Note: Chromebook, Android, iOS, Kindle, etc. will not be sufficient
> Atkins Library Laptop Checkout Information: https://library.uncc.edu/check-out-request/borrow-laptopsLinks to an external site.

2) RealizeIt Subscription:
> This online platform contains the text content and homework assignments for the course. This course is part of the First Day™ program. Required digital course materials are delivered on Canvas at the discounted rate of $47.73 billed to your student account. Please visit the First Day website to learn more about the program. **https://aux.uncc.edu/first-day**

3) Poll Everywhere:
> This online tool allows students to submit answers for quizzes and polls in class.

4) Microsoft Excel:

    This software will be used to create spreadsheets and analyze data. It can be accessed in the university computer labs or on your personal devices through your university account. Students will utilize Excel in the RealizeIt pre-class assignments and in class as well.

5) Laptop:

    It is recommended that you have a laptop or other device that is able to access Excel. You and your group members will use Excel to solve problems.

Meeting Times

For STAT 1222 Face to Face Format:

This course will be taught in its assigned format/room at the specific meeting times set by the University and available in the University Schedule for the section in which you registered. Be sure to check the University Schedule for any changes to format/room; only official changes updated by the registrar will be followed. The course also has common due dates, test dates, and a required common final exam date (to be determined by the Registrar's Office).

For STAT 1222 Online Format:

This course will be taught 100% online and delivered using Canvas. This course does not have specific meeting times, but it does have common due dates, test dates, and a required final exam date (to be determined by the Registrar's Office).

Class Structure

Before Class:

    Students are expected to read the text, watch the pre-class videos, and complete the pre-class assignment in RealizeIt for each module section as assigned in Canvas. Students should take notes of the videos and their work for the assignment problems.

During Class:

    In class, students will participate in the Poll Everywhere activities to assess their initial understanding based on the pre-class content materials. Moreover, students are assigned groups (via Canvas) in which they will work through many of the in-class Canvas assignments together. Of course, all tests and the final exam will NOT be group work, so it is important that each student develops an in-depth understanding of all materials.

After Class:

    If students do not finish the in-class activity during class time, they need to catch up after class. There are many free resources available on campus such as the tutoring hours offered by the professor, preceptors, Math Learning Center, and the University Center of Academic Excellence. Students are expected to utilize these tutoring resources for help with their assignments.

<u>Proposed Course Topic Outline:</u>

Module 0: Orientation

- Statistics for Social Scientists: - What's in it for me ?
- Needed Skills from Pre-Algebra and High School Algebra
  - Decimals and Percents
  - Proportions
  - Rounding
  - Inequality Notation
  - Interval Notation
  - Order of Operations
  - Evaluating Equations
  - Solving Equations
  - Plotting Data Points
- Introduction to RealizeIt, Excel, and PowerPoint

Module 1: Descriptive Statistics

- Sampling and Data
  - Population vs Sample
  - Quantitative vs Qualitative Data
  - Levels of Measurement
  - Sampling Techniques
- Graphical Summary
  - Data Lists & Frequency Tables
  - Histograms
- Numerical Summary
  - Mean, Median, Mode
  - Variance & Standard Deviation
  - Shapes of Distributions
- Numerical Measures for Individual Values
  - z-scores
  - Percentiles
- Statistical Literacy with Descriptive Data
- **Project 1: Uses of Descriptive Statistics in Social Sciences**
- **Test #1**

Module 2: Distributions and Estimation

- Discrete Random Variables
  - Sample Spaces, Events, & Basic Probability
  - Probability Distributions for Discrete Random Variables
  - The Binomial Distribution
- Continuous Random Variables
  - The Standard Normal Distribution
  - Normal Distributions

- - The t-distribution
- Inferential Statistics: 1-Sample Confidence Intervals
  - Sampling Distributions and The Central Limit Theorem
  - Large Sample Confidence Interval for the Population Mean
  - Small Sample Confidence Interval for the Population Mean
  - Large Sample Confidence Interval for the Population Proportion
- **Project 2: Statistical Literacy with 1-Sample Confidence Intervals**
- **Test #2**

Module 3: Hypothesis Testing

- Inferential Statistics: Components of Hypothesis Testing
  - Null and Alternative Hypotheses
  - Types of Errors & Levels of Significance
- Inferential Statistics: 1-Sample Hypothesis Testing
  - The P-Value Method
  - Large Sample Hypothesis Tests for the Population Mean
  - Small Sample Hypothesis Tests for the Population Mean
  - Large Sample Hypothesis Tests for the Population Proportion
- **Project 3: Statistical Literacy with 1-Sample Hypothesis Tests**
- **Test #3**
- **Final Exam**