OFFICIAL SYLLABUS

STAT 107 – CONCEPTS OF STATISTICS

On-Line Course

(Adopted Summer 2015; Committee: J. Pailden, Z. Agustin, A. Bartlett)

Catalog Description: Basic concepts of descriptive statistics; probability distribution and inferential statistics (estimating parameters and testing hypotheses); sampling, experimental design, correlation and regression, consumer price index. Credit may not be granted for both STAT 107 and STAT 244. Prerequisite: One and one-half years of high school algebra or AD 095

Textbook: Elementary Statistics: Looking at the Big Picture, 1st Edition with WebAssign

by Nancy Pfenning

Course Outline and Topics

Chapter 1: Introduction: Variables and Processes in Statistics

Chapter 2: Sampling: Which Individuals Are Studied?

Chapter 3: Design: How Individuals Are Studied 30

3.1 Various Designs for Studying Variables

3.2 Sample Surveys: When Individuals Report Their Own Values

3.3 Observational Studies: When Nature Takes Its Course

- Confounding Variables and Causation
- Paired or Two-Sample Studies*
- Prospective or Retrospective Studies: Forward or Backward in Time*

3.4 Experiments: When Researchers Take Control

- Randomized Controlled Experiments
- Double-Blind Experiments
- Pitfalls in Experimentation

Chapter 4: Displaying and Summarizing Data for a Single Variable

4.1 Single Categorical Variable

4.2 Single Quantitative Variables and the Shape of a Distribution

4.3 Center and Spread: What's Typical for Quantitative Values, and How They Vary?

4.4 Normal Distributions: The Shape of Things to Come

Chapter 5: Displaying and Summarizing Relationships

5.1 Relationships between One Categorical and One Quantitative Variable

- Different Approaches for Different Study Designs
- Data from a Two-Sample Design
- Data from a Several-Sample Design*
- Data from a Paired Design*
- Generalizing from Samples to Populations: The Role of Spreads

5.3 Relationships between Two Quantitative Variables

- Displays and Summaries: Scatterplots, Form, Direction, and Strength
- Correlation: One Number for Direction and Strength
- Correlation Is Unaffected by Units of Measurement
- Least Squares Regression Line: What We See in a Linear Plot
- Sample versus Population: Thinking Beyond the Data at Hand

Section 6.1: The Meaning of "Probability" and Basic Rules

- Permissible Probabilities
- Probabilities Summing to One
- Probability of "Not" Happening
- Probability of One "Or" the Other for Non-overlapping Events

Section 8.1 and Chapter 9 (Inference on a Population Proportion)

8.1 The Behavior of Sample Proportion in Repeated Random Samples

9.1 Point Estimate and Confidence Interval: A Best Guess and a Range of Plausible Values for Population Proportion

9.2 Hypothesis Test: Is a Proposed Population Proportion Plausible?

Section 9.2 and Section 10.1 (Inference on a Population Mean)*

8.2 The Behavior of Sample Mean in Repeated Random Samples*

10.1 Inference for a Mean When Population Standard Deviation Is Known or Sample Size Is Large*

Learning Objectives:

After completion of the course, students will be able to:

- determine methods of sampling and designs of experiments that are most appropriate or the problem on hand
- determine methods and strategies for exploring, organizing, and summarizing data using appropriate graphical and numerical summaries
- understand the basic concept of probability and use it as a language to describe chance, variation, and risk

- understand the process of statistical inference and be able to draw conclusions about a population based on sample data
- read analytically results of statistical studies such as surveys and experiments
- appreciate statistical ideas and their impact on everyday living and decision making

Any instructor should cover all of the material specified, except the starred chapters which are optional.