

STAT 380: Statistics for Applications

Course Description: Descriptive statistics; basic probability rules and distributions; inferences for means, variance and proportions; regression analysis. Prerequisite: MATH 152

Textbooks: (1) *Statistical Methods for Engineers* by G. Geoffrey Vining, Brooks/Cole Pub., 3rd Ed.
(2) *Probability and Statistics for Engineers and Scientists 9th Ed.* By Walpole, Myers, Ye, Prentice Hall

Course Outline and Topics*

- (1) 2. Data Displays (2 class periods)
 - 2.2 Stem-and-Leaf Displays
 - 2.3 Boxplots
 - 2.4 Using Computer Software
- (2) 2. Probability (2 class periods)
 - 2.1 Sample Space
 - 2.2 Events
 - 2.4 Probability of an Event
 - 2.5 Additive Rules
 - 2.6 Conditional Probability
 - 2.7 Multiplicative Rules
- (2) 3. Random Variables and Probability (2 class periods)
 - 3.1 Concept of a Random Variable
 - 3.2 Discrete Probability Distributions
 - 3.3 Continuous Probability Distributions
- (2) 4. Mathematical Expectation (1 class period)
 - 4.1 Mean of a Random Variable
 - 4.2 Variance and Covariance of Random Variables* *
- (2) 5. Some Discrete Probability Distributions (2 class periods)
 - 5.3 Binomial and Multinomial Distributions* * *
 - 5.5 Negative Binomial and Geometric Distributions
 - 5.6 Poisson Distribution and the Poisson Process
- (2) 6. Some Continuous Probability Distributions (5 class periods)
 - 6.1 Continuous Uniform Distribution
 - 6.2 Normal Distribution
 - 6.3 Areas under the Normal Curve
 - 6.4 Applications of the Normal Distributions
 - 6.5 Normal Approximation to the Binomial
 - 6.6 Gamma and Exponential Distributions
 - 6.7 Applications of the Exponential and Gamma Distributions
 - 6.8 Chi-Squared Distribution
- (2) 8. Fundamental Sampling and Data Descriptions (3 class periods)
 - 8.2 Some Important Statistics
 - 8.4 Sampling Distributions
 - 8.5 Sampling Distribution of Means
 - 8.6 Sampling Distribution of S²
 - 8.7 t-Distribution
- (1) 4. Estimation and Testing (8 class periods)
 - 4.1 Estimation
 - 4.2 Hypothesis Testing

- 4.3 Inference for a Single Mean
- 4.4 Inference for Proportions
- 4.5 Inference for Two Independent Samples
- 4.6 Paired t-Test
- 4.7 Inference for a Single Variance
- 4.8 p-Values

(1) 6. Linear Regression Analysis (3 class periods)

- 6.1 Relationship Among Data
- 6.2 Simple Linear Regression
- 6.3 Multiple Linear Regression
- 6.4 Residual Analysis

*The suggested class period per chapter assumes two 75-minute class periods per week (total of 30 class periods per semester) with two exams per semester.

**Only expected to discuss variance and standard deviation of a random variable.

***Expected to do just the binomial distribution