

STAT 321 – Probability and Statistics for Engineers and Scientists

Fall 2015

1. Catalog Description

STAT 321 Probability and Statistics for Engineers and Scientists (4)

GE B6

Tabular and graphical methods for data summary, numerical summary measures, probability concepts and properties, discrete and continuous probability distributions, expected values, statistics and their sampling distributions, point estimation, confidence intervals for a mean and proportion. Use of statistical software. 4 lectures. Fulfills GE B6.

2. Required Background and/or Experience

MATH 142

3. Expected Outcomes

The student should be able to:

- a. summarize data using graphical and numerical methods;
- b. use definitions and basic properties to solve probability problems;
- c. correctly apply discrete probability models, especially the binomial, hypergeometric, and Poisson distributions;
- d. correctly apply continuous probability models, especially the normal and exponential distributions;
- e. use properties of linear combinations of random variables and the Central Limit Theorem;
- f. understand the objective and concepts of point estimation;
- g. understand the objective and basic properties of interval estimation; and
- h. calculate confidence intervals for a variety of parameters.

4. Text and References

Text: Navidi, W., *Statistics for Engineers and Scientists*, 4th ed., McGraw-Hill, 2014.

Devore, J., *Probability and Statistics for Engineering and the Sciences*, 9th ed., Cengage Learning, 2016.

References: Montgomery, D. and Runger, G., *Applied Statistics and Probability for Engineers*, 5th ed., Wiley, 2011.

Ledolter, J. and Hogg, R., *Applied Statistics for Engineers and Physical Scientists*, 3rd ed., Pearson, 2009.

5. Minimum Student Materials

Hand calculator, access to statistical software.

6. Minimum University Facilities

Chalkboards for class use. Computer facilities for student use in preparing assignments.

7. Expanded Description of Content and Method

<u>CONTENT</u>	<u>NUMBER OF LECTURES</u>
A. Introduction and descriptive statistics	5
1. Branches of statistics, nature of data	
2. Histograms, stem-and-leaf displays	
3. Measures of center and spread	
4. Boxplots	
5. Introduction to MINITAB	
B. Probability	7
1. Sample spaces	
2. Axioms and properties	
3. Counting techniques	
4. Conditional probability and independence	
C. Discrete probability distributions.....	6
1. Probability distributions	
2. Expected values	
3. Binomial distribution	
4. Hypergeometric, negative binomial, and Poisson distributions	
D. Continuous probability distributions.....	6
1. Continuous random variables and densities	
2. Expected values	
3. Normal distributions	
4. Other continuous distributions (uniform, exponential, Weibull, lognormal)	
5. Probability plots	
E. Joint probability distributions	5
1. Jointly distributed random variables	
2. Expected values	
3. Statistics and their distributions	
4. Distribution of \bar{X} and the Central Limit Theorem	
5. Linear combinations of random variables	
F. Estimation.....	7
1. Point estimation	
2. Introduction to confidence intervals	
3. Large-sample interval for a population proportion	
4. The one-sample t interval for a population mean	

8. Method of Evaluating Outcome

Problem assignments, scheduled tests, and final examination.