

STAT 321 – Probability and Statistics for Engineers and Scientists

March 2007

1. Catalog Description

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

GEB B.6

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 MINITAB computer package. 4 lectures. Prerequisite: MATH 142.

2. Required Background and/or Experience

MATH 142

3. Expected Outcomes

The student should be:

- a. able to summarize data using a stem-and-leaf display, frequency distribution, histogram, mean, median, and standard deviation;
- b. able to use definitions and basic properties to solve probability problems;
- c. familiar with discrete distributions, including especially the binomial, hypergeometric, and Poisson distributions;
- d. familiar with continuous distributions, especially the normal and exponential distributions;
- e. able to use basic properties of linear combinations of random variables and the Central Limit Theorem;
- f. acquainted with the basic objective and concepts of point estimation;
- g. able to understand the objective and basic properties of interval estimation; and
- h. able to calculate confidence intervals for a population mean.

4. Text and References

Text: Devore, Jay, *Probability and Statistics for Engineering and the Sciences*, 7th Edition, Duxbury Press 2007.

References: Montgomery, Douglas and Runger, George C., *Applied Statistics and Probability for Engineers*, 3rd ed., Wiley, New York, 2003.

Hogg, Robert and Ledolter, Johannes, *Engineering Statistics*, 2nd ed., MacMillan, New York, 1992

5. Minimum Student Materials

Hand calculator.

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 (Ch. 1)	7
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 (Ch. 2) 6	
1. Sample spaces (2.1)	
2. Axioms and properties (2.2)	
3. Counting techniques (2.3)	
4. Conditional probability and independence (2.4, 2.5)	
C. Discrete probability distributions.....	6
1. Probability distributions (3.1, 3.2)	
2. Expected values (3.3)	
3. Binomial distribution (3.4)	
4. Hypergeometric, negative binomial, and Poisson distributions (3.5, 3.6)	
D. Continuous probability distributions	6
1. Continuous random variables and densities (4.1)	
2. Expected values (4.2)	
3. Normal distributions (4.3) (mention normal probability plots, 4.6)	
4. Other continuous distributions [exponential, Weibull, lognormal] (4.4, 4.5)	
5. Probability plotting (4.6)	
E. Joint probability distributions	5
1. Jointly distributed random variables (5.1)	
2. Expected values, (5.2)	
3. Statistics and their distributions (5.3)	
4. Distribution of \bar{X} and the Central Limit Theorem (5.4)	
5. Linear combinations of random variables (5.5)	
F. Estimation	5
1. General concepts of point estimation (6.1)	
2. Maximum likelihood estimation (6.2)	
3. Introduction to confidence intervals (7.1)	
4. Large-sample interval for a population mean and proportion (7.2)	
5. The one-sample t interval (7.3)	

8. Method of Evaluating Outcome

Daily problem assignments, scheduled tests, and final examination.