

CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, California

STAT 542 - Statistical Methods For Engineers

Fall 2007

1. Catalog Description

STAT 542 Statistical Methods for Engineers 4 units

Descriptive and graphical methods. Discrete and continuous probability distributions. One and two sample confidence intervals and hypothesis testing. Single factor analysis of variance. Quality control. Introduction to regression and to experimental design. Use of computer to solve problems.
4 lectures.

2. Required Prerequisite Preparation

Math 142 and graduate standing

3. Expected Outcomes

The student should be able to:

- a. Summarize data sets using graphical and tabular methods.
- b. Compute and interpret measures of central tendency and variability.
- c. Understand basic concepts of probability; solve probability problems.
- d. Understand the nature of probability distributions for both discrete and continuous random variables; solve engineering problems using these distributions.
- e. Construct and interpret confidence intervals for a population mean, proportion, and the difference between two means.
- f. Determine an appropriate sample size when estimating a mean and proportion.
- g. Test hypotheses about a population mean, proportion, difference between two means, and independence.
- h. Carry out a single factor analysis of variance.
- i. Understand the principles of regression; compute measures of association; fit a line of best fit.
- j. Understand the basic principles important in experimental design.
- k. Understand the function of control charts.

4. Text and References

Possible Texts: *Statistics for Engineers and Scientists*, Devore and Farnum, Brooks/Cole/ITP, 2005
 Applied Statistics for Engineers and Scientists, Levine, Ramsey, and Smidt, PH, 2001
 Applied Statistics and Probability for Engineers, Montgomery and Runger, Wiley, 2007

5. Minimum Student Materials Required

Text and calculator.

6. Minimum Facilities Required

Classroom with chalkboards, audiovisual equipment, and computer access.

7. Expanded Description of Content

CONTENT	NUMBER OF LECTURES
a. Data collection and graphical and numerical descriptive statistics	6
1. Graphical methods (histograms, stem-and-leaf displays, boxplots)	
2. Numerical summary measures	
3. Introduction to MINITAB	
b. Introduction to probability	2.5
c. Discrete probability distributions	3
1. Binomial	
2. Poisson	
3. Hypergeometric	
d. Continuous probability distributions	3
1. Normal (including assessing the normality assumption)	
2. Exponential	
3. Weibull	
e. Sampling distributions	2
f. Confidence intervals	4
1. Large sample interval for a population mean	
2. Small sample interval for a normal population mean	
3. Large sample interval for a population proportion	
4. Intervals for the difference between two means	
5. Sample size determination for a population mean and population proportion	
g. Significance tests	5
1. Large sample test for a population mean	
2. Small sample test for a normal population mean	
3. Large sample test for a population proportion	
4. Test for the difference between two means	
5. Chi-square test of independence	
h. Experimental design and analysis of variance	5
1. Basic principles in experimental design (including factorial designs)	
2. Single-factor ANOVA	
3. Multiple comparisons	
i. Describing relationships in bivariate and multivariate data	4
1. Scatter plots, fitting a line	
2. Fitting a curve (transformations, polynomials)	
3. Correlation	
j. Tools of quality control	1.5
1. Control charts (X-bar - R charts, p charts, c-charts)	
TOTAL	36

8. Method of Evaluating Outcomes

Periodic assignments (e.g., problem sets, team-based activities, projects) may be combined with in-class examinations (e.g., quizzes, midterms, final exam)