CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, California

STAT 312 - Statistical Methods For Engineers **Fall 2015**

1. Catalog Description

Statistical Methods for Engineers 4 units
Descriptive and graphical methods. Selected discrete and continuous probability distributions. Selected one- and two-sample confidence intervals and hypothesis tests. Introduction to single factor analysis of variance. Selected topics in quality control. Introduction to regression and to experimental design. Use of computer to solve problems.
4 lectures.

2. Required Prerequisite Preparation

Math 142

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. Apply basic concepts of probability; solve probability problems.
d. Describe and contrast 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 population mean or a population proportion.
g. Test hypotheses about a population mean, proportion, difference between two means, and independence of two variables.
h. Carry out a single factor analysis of variance.
i. Explain the principles of regression; use technology to compute measures of association; use technology to fit a line of best fit.
j. Describe the basic principles important in experimental design.
k. Discuss and interpret the function of control charts.

4. Text and References

Possible Texts:
Statistics for Engineers and Scientists, Third Edition, Devore, Farnum and Doi, Cengage Learning, 2014
Applied Statistics for Engineers and Scientists, Levine, Ramsey, and Smidt, PH, 2001
Probability & Statistics for Engineers & Scientists, Ninth Edition, Walpole, Myers, Myers and Ye, PH, 2012

5. Minimum Student Materials Required

Text and graphing calculator.

6. Minimum Facilities Required

Classroom with chalkboards and audiovisual equipment.

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) may be combined with in-class examinations (*e.g.*, quizzes, midterms, final exam).