CALIFORNIA POLYTECHNIC STATE UNIVERSITY
San Luis Obispo, California

STAT 425 – Probability Theory

Fall 2017

1. Catalog Description

STAT 425 Probability Theory (4)
Basic probability theory, combinatorial methods, independence, conditional and marginal probability, probability models for random phenomena, random variables, probability distributions, distributions of functions of random variables, mathematical expectation, covariance and correlation, conditional expectation. 4 lectures. Prerequisite: MATH 241; and MATH 248 or CSC 348. Recommended: STAT 301 and STAT 305.

2. Required Background and/or Experience

MATH 241; and MATH 248 or CSC 348. Recommended: STAT 301 and STAT 305.

3. Expected Outcomes

The student should:

a. be familiar with the basic approaches to the definition of probability;
b. understand basic theory to construct probability models for both discrete and continuous random variables;
c. understand and be able to use distribution functions;
d. understand the meaning and the applications of joint probability and joint distribution functions;
e. understand the concepts and expectations with respect to a given probability function; and
f. understand the meaning of conditional and marginal probability functions.

4. Text and References

Text: [redacted]ot, M.H. and Schervish, M.J., *Probability and Statistics*, 4th ed., Addison Wesley, 2012.

References: Larsen and Marx, *An Introduction to Mathematical Statistics and its Applications,* 3rd ed., Prentice Hall, 2001.

[redacted] McKean, and Craig, *Introduction to Mathematical Statistics*, 6th ed., Macmillan, 2004.

5. Minimum Student Materials

None.

6. Minimum University Facilities

Chalkboards for class use. Overhead projectors.

7. Expanded Description of Content and Method

Content:		*Number of Lectures*
A.	**Introduction to Probability**	8
1.4 - 1.6	1. Concepts and Definitions	
	2. Sample Spaces	
1.7 - 1.10	3. Counting and Combinatorial Methods	
	4. Independence	
B.	**Conditional Probability**	8
2.1 - 2.4	1. Definitions	
	2. Bayes Theorem	
	3. Markov Chains *	
	4. Gambler's Ruin	
C.	**Random Variables**	14
3.1 - 3.4	1. Discrete and Continuous Variables	
	2. Bivariate Distributions	
3.5 - 3.7	3. Marginal and Conditional Distributions	
	4. Multivariate Distributions	
3.8 - 3.9	5. Distribution of a function of one or more random variables	
	6. Transformation of one or more random variables	
H & C 4.4	7. Order statistics	
D.	**Expected Values**	8
4.1 - 4.3	1. Expected Value and Variance	
	2. Properties of Expected Values	
	3. Moments of a Distribution	
4.4 - 4.7	4. Covariance and Correlation	
	5. Conditional Expectation	
	Total	38

Method:

Largely lecture with blackboard illustrations of the discussion along with supervised work and individual conferences.

8. Method of Evaluating Outcome

Problem assignments, scheduled tests, and final examination.