Palestine Polytechnic University
College of Engineering

Probability and Statistics for Engineers
Term 192

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Course Objectives: Introduce the basic concepts of probability and statistics to engineering students. Emphasis will be given on the understanding of the nature of randomness of real world phenomena; the formulation of statistical methods by using intuitive arguments, solving them and thereby making meaningful decisions.

***Learning Outcomes**:* By completing this course, students should acquire/learn

- A thorough understanding of descriptive statistics, both graphical and numerical
- A working knowledge of sample spaces, events, and operations on events
- Elementary probability concepts
- A good understanding of random variables and their means and variances
- Basic discrete and continuous random variables
- The concept of a sampling distribution, and the central limit theorem
- Point and interval estimation of means and proportions
- Basic concepts of hypothesis testing including the hypothesis testing setup, procedure, p-values
- Correlation
- Simple linear regression, including estimation and testing of model parameters

Text: Applied Statistics and Probability for Engineers by D. Montgomery and G. Runger, 6th Edition, Wiley, 2014.

Software Package: Use **SPSS**.

Assessment*

Activity	Weight
Class work & assignments	20%
First Major Exam	20%
Second Major Exam	20%
Final Exam (Comprehensive)	40%

Schedule

WEEK	Topics
Week 1	**Ch 2: Probability** 2.1 Sample Space and Events (2-1.1 – 2-1.3) 2.2 Axioms of Probability 2.3 Addition Rule 2.4 Conditional Probability
Week 2	2.5 Multiplication Rule 2.6 Independence 2.7 Bayes' Theorem **Ch 3: Discrete Probability Distributions** 3.1 Discrete Random variables 3.2 Probability Mass Functions 3.3 Cumulative Distribution Functions
Week 3	3.4 Mean and Variance 3.5 Discrete Uniform Distribution 3.6 Binomial Distribution 3.7 Geometric Distribution
	3.8 Hypergeometric Distribution 3.9 Poisson Distribution

Week 4	**Ch 4: Continuous Probability Distributions** 4.1 Continuous Random Variables 4.2 Probability Density Functions
Week 5	4.3 Cumulative Distribution Functions 4.4 Mean and Variance 4.5 Continuous Uniform Distribution
Week 6	4.6 The Normal Distribution 4.7 Normal Approximation to the Binomial and Poisson 4.8 Exponential Distribution
Week 7	**Ch 7: Sampling Distributions** 7.1 Point Estimation 7.2 Sampling Distributions and the Central Limit Theorem
Week 8	**Ch 8: Statistical Intervals for a Single Sample** 8.1 Confidence Interval for the Mean of a Normal Distribution with Known Variance 8.2 Confidence Interval for the Mean of a Normal Distribution with Unknown Variance
Week 9	8.4 Large Sample Confidence Interval for a Population Proportion **Ch 10: Statistical Inference for Two Samples** 10-1.3 Intervals on the Difference in Means of Two Normal Distributions with Known Variances
Week 10	10-2.3 Intervals on the Difference in Means of Two Normal Distributions with Unknown Variances 10-6.3 Large Sample Intervals on the Difference in Population Proportions
Week 11	**Ch 9: Tests of Hypotheses for a Single Sample** 9.1 Hypothesis Testing 9-2.1 Tests on the Mean of a Normal Distribution with Known Variance 9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance
Week 12	9-5.1 Tests on a Population Proportion **Ch 10: Statistical Inference for Two Samples Continued** 10-1.1 Tests on the Difference in Means of Two Normal Distributions with Known variances 10-2.1 Tests on the Difference in Means of Two Normal Distributions with Unknown Variances
Week 13	10.4 Paired t-test 10-6.1 Large Sample Tests on the Difference in Population Proportions
Week 14	**Ch 11: Simple Linear Regression and Correlation** 11.2 Simple Linear Regression 11.3 Properties of the least squares estimators 11-4.1 Hypothesis Tests in Simple Linear Regression
Week 15	11.5 Confidence Intervals 11.6 Prediction of New Observations
Week 16	11-7.2 Coefficient of determination 11.8 Correlation

Homework Problems

Following are the homework problems for all the chapters to be covered in STAT 319 course.

Ch. 2: 8, 25, 37, 42, 55, 63, 77, 88, 102, 108, 125, 141, 149, 153, 172.

Ch. 3: 3, 5, 12, 17, 23, 37, 42, 58, 65, 85, 109, 122, 137.

Ch. 4: 4, 10, 14, 23, 35, 43, 49, 51, 53, 61, 68, 70, 83, 87, 99, 105.

Ch. 6: 12, 14, 35, 37, 46, 55, 56.

Ch. 7: 3, 7, 10, 12.

Ch. 8: 4, 7, 11, 27, 35, 40, 58.

Ch. 9: 5, 9, 26(a), 40, 66, 67, 90, 93.

Ch. 10: 4(a-c), 17, 19, 20, 40(b), 44, 69.

Ch. 11: 8, 27, 44, 70.