King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
STAT319: Probability and Statistics for Engineers and Scientists
Term 162

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Office Hours: UTR 7:45 – 9:45 or by appointment.

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 and multiple 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: The Student Edition of ***STATISTICA*** with a Lab Manual. A Lab syllabus is available with your lab instructor.

Assessment*

Activity	Weight
Homework	5%
Quizzes – TBA by instructor	10%
Lab Work (see Lab syllabus)	20%
Midterm Exam (Chapters 2, 3, 4 and Descriptive Statistics) Tuesday March 28, 2017 18:15 in 59-2004	25%
Final Exam (Comprehensive) Thursday May 25, 2017 19:00 – 21:30 in 57-006	40%

Grade Assignment

Score	87 – 100	80 – 86	75 – 79	70 – 74	65 – 69	60 – 64	55 – 59	50 – 54
Grade	A+	A	B+	B	C+	C	D+	D

Academic Integrity: All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.

Schedule

WEEK	Topics
Week 1 February 5 -	**Ch 2: Probability** 2-1.1 2-1.3Random Experiments, Sample Spaces and Events 2-2 Interpretations and Axioms of Probability 2-3 Addition Rules 2-4 Conditional Probability
Week 2 February 12 -	2-5 Multiplication Rule 2-6 Independence 2-7 Bayes' Theorem **Ch 3: Discrete Probability Distributions** 3-1 Discrete Random variables 3-2 Probability Distributions and Probability Mass Functions 3-3 Cumulative Distribution Functions
Week 3 February 19 -	3-4 Mean and Variance of a Discrete Random Variable 3-5 Discrete Uniform Distribution 3-6 Binomial Distribution 3-7-1 Geometric Distribution Only
Week 4 February 26 -	3-8 Hypergeometric Distribution 3-9 Poisson Distribution **Ch 4: Continuous Probability Distributions** 4-1 Continuous Random Variables 4-2 Probability Distributions and Probability Density Functions
Week 5 March 5 –	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution
Week 6 March 12 –	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions 4-8 Exponential Distribution
Week 7 March 19 –	4-10 Weibull Distribution 4-11 Lognormal Distribution
Week 8 March 26 –	**Ch 7: Sampling Distributions** 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem
Week 9 April 9 -	**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 8-4 Large Sample Confidence Interval for a Population Proportion
Week 10 April 16 –	**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 9-2.3 Large-Sample Test
Week 11 April 23 –	9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance 9-5.1 Tests on a Population Proportion
Week 12 April 30 -	**Ch 11: Simple Linear Regression and Correlation** 11-1 Empirical Models 11-2 Simple Linear Regression 11-3 Properties of the least squares estimators 11-4 Hypothesis Tests in Simple Linear Regression
Week 13 May 7 –	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation
Week 14 May 14 –	**Ch 12: Multiple Linear Regression** 12-1 Multiple Linear Regression Model 12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression
Week 15 May 21 –	12-4 Prediction of New Observations 12-5.1 Residual Analysis 12-5.2 Influential Observations (Optional)

Important Notes:

- ✓ Please bring your book to every class, as well as a calculator with statistical functions.
- ✓ Excessive unexcused absences will result in a grade of ***DN*** in accordance with University rules.
- ✓ ***Attendance*** on time is ***very*** important.

Home Work:

- ✓ To successfully learn statistics, students need to solve problems and analyze data. The selected assigned problems are specifically designed to help you understand the material.
- ✓ Homework is due in class on the first Sunday after completing a chapter.
- ✓ No late homework will be accepted.

Homework Problems

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, 128, 129, 141.

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. 11: 8, 27, 44, 70.