

King Fahd University of Petroleum and Minerals
 Department of Mathematics and Statistics
STAT319: Probability and Statistics for Engineers and Scientists
 Term 172

Instructor: **Office:**
Phone: **E-mail:**
Office Hours:

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: See STAT-319 Lab syllabus.

Detailed discussion of descriptive statistics will be done in the first few weeks of the lab, then a written test on that using, both by hand and by the statistical package will be given in the 5th week. See Lab syllabus

Assessment*

Activity	Weight
Class Evaluation (homework, quizzes, etc.)	10%
Lab Work (see Lab syllabus)	20%
Descriptive Statistics Exam – Given During a Lab Session	5%
First Major Exam (Chapters 2 – 4 excluding Sections 4.6, 4.7 & 4.11) Monday March 5, 2018; 6:00 pm	15%
Second Major Exam (Chapters 7 – 9 + Sections 4.6, 4.7 & 4.11) Monday April 16, 2018; 6:15 pm	15%
Final Exam (Comprehensive)	35%

Grade Assignment

Score	87 – 100	80 – 86.9	75 – 79.9	70 – 74.9	65 – 69.9	60 – 64.9	55 – 59.9	50 – 54.9	< 50
Grade	A+	A	B+	B	C+	C	D+	D	F

Schedule

WEEK	Topics
Week 1 January 21 -	Chapter 2: Probability 2-1.1 2-1.3 Random Experiments, Sample Spaces and Events 2-2 Interpretations and Axioms of Probability 2-3 Addition Rules 2-4 Conditional Probability 2-5 Multiplication Rule
Week 2 January 28 -	2-6 Independence 2-7 Bayes' Theorem Chapter 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 4 -	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 11 -	3-8 Hypergeometric Distribution 3-9 Poisson Distribution Chapter 4: Continuous Probability Distributions 4-1 Continuous Random Variables 4-2 Probability Distributions and Probability Density Functions
Week 5 February 18 -	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable
Week 6 February 25 -	4-5 Continuous Uniform Distribution 4-8 Exponential Distribution 4-10 Weibull Distribution
Week 7 March 4 -	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions 4-11 Lognormal Distribution
Week 8 March 11 -	Chapter 7: Sampling Distributions 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem
Week 9 March 18 -	Chapter 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 March 25 -	Chapter 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
Week 11 April 1 -	9-2.3 Large-Sample Test 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 8 -	Chapter 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 April 15 -	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation
Week 14 April 22 -	Chapter 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 April 29 -	12-4 Prediction of New Observations 12-5.1 Residual Analysis 12-5.2 Influential Observations

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

Important Notes:

- ✓ Please bring your book to every class, as well as a calculator with statistical functions.
- ✓ Excessive unexcused absences (**09**) will result in a grade of **DN** in accordance with University rules.
- ✓ **Attendance** on time is **very** important.

Homework:

- ✓ 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, 55, 63, 77, 88, 102, 108, 125, 141, 149, 153 and 172.

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

Ch. 4: 4, 10, 14, 23, 35, 43, 49, 51, 53, 61, 68, 70, 83, 87, 99, 105, 131 and 141.

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

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

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

Ch. 11: 2, 8, 24, 44 and 70.