

King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
STAT319: Probability and Statistics for Engineers and Scientists
Term 212

Instructor:
Phone:
Office Hours:

Office:
E-mail:

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: MINITAB, See STAT-319 Lab syllabus.

Assessment*

Activity	Weight
Lab Work (see Lab syllabus)	15%
Class Evaluation (homework, quizzes) [the average will be in the interval 70% and 75%]	10%
First Major Exam Chapters 2, 3, Sections 4-1 – 4-5, + Descriptive Statistics Week 6 (tentative)	20%
Second Major Exam Sections 4-6 – 4-11, Chapters 7, 8 Week 11 (tentative)	20%
Final Exam (Comprehensive) As per registrar office announcement	35%

Important Notes:

- ✓ Please bring your book to every class, as well as a calculator with statistical functions.
- ✓ Excessive unexcused absences (**Nine**) will result in a grade of **DN** in accordance with University rules.
- ✓ **Attendance** on time is **very** important
- ✓ **Missing an Exam:** In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he must bring an official excuse from Students Affairs. Otherwise, he will get zero in the missed exam.
- ✓ The scores for the lab, the classwork and the majors will be rounded to the nearest integer.

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

Schedule

WEEK	Topics
Week 1	Ch 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	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	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	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	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution
Week 6	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions
Week 7	4-8 Exponential Distribution 4-10 Weibull Distribution 4-11 Lognormal Distribution
Week 8	Ch 7: Sampling Distributions 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem
Week 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	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	9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance 9-5.1 Tests on a Population Proportion
Week 12	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	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation
Week 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	12-4 Prediction of New Observations 12-5.1 Residual Analysis 12-5.2 Influential Observations (Optional)

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, 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 and 58.

Ch. 9: 9, 40(a), 40(b), 66, 67, 90(a) and 92.

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

Ch. 12: 1, 4, 8, 10, 21, 22, 28, 46 and 60.