King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
STAT319: Probability and Statistics for Engineers and Scientists
Term 171

Instructor: Mohammad F. Saleh   **Office:** 5 - 312
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Office Hours: 11:00 am – 12:00 pm UMW (tentative)

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.

Assessment*

Activity	Weight
Class Evaluation (homework, quizzes, attendance, etc.)	10%
Lab Work (see Lab syllabus)	20%
First Major Exam (Chapters 2 – 4 excluding Sections 4.6, 4.7 & 4.11) Date and Time: 23-10-2017 Monday (5:30 PM)	15%
Second Major Exam (Chapters 6 – 9 + Sections 4.6, 4.7 & 4.11) Date and Time: 29-11-2017 Wednesday (5:30 PM)	20%
Final Exam (Comprehensive) Date and Time: 09-01-2018 Tuesday (8:00 AM)	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	0 – 49.9
Grade	A+	A	B+	B	C+	C	D+	D	F

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

Schedule

WEEK	Topics
Week 1 Sep 17 – 21	**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 2-5 Multiplication Rule
Week 2 Sep 24 - 28	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 Oct 1 – 5	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 Oct 8 – 13 + Oct 7	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 Oct 15 – 19	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution
Week 6 Oct 22 – 27	4-8 Exponential Distribution 4-10 Weibull Distribution **Major 1 on Monday 23rd October**
Week 7 Oct 29 – Nov 2	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions 4-11 Lognormal Distribution
Week 8 Nov 5 – 9	**Ch 7: Sampling Distributions** 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem
Week 9 Nov 12 – 16	**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 Nov 19 – 23	**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 Nov 26 – 30	9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance 9-5.1 Tests on a Population Proportion **Major 2 on Wednesday 29th November**
Week 12 Dec 3 – 7	**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 Dec 10 – 14	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation
Week 14 Dec 17 – 21	**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 Dec 24 – 28	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 (**09**) 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 <u>in class</u> 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. 6: 12, 14, 35, 37, 46, 55 and 56.
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.