

King Fahd University of Petroleum and Minerals  
 Department of Mathematics and Statistics  
**STAT319: Probability and Statistics for Engineers and Scientists**  
 Term 182

**Instructor:** **Office:**  
**Phone:** **E-mail:** @kfupm.edu.sa  
**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, 6<sup>th</sup> Edition, Wiley, 2014

**Software Package:** See STAT-319 Lab syllabus.

**Assessment\***

Activity	Weight
Lab Work (see Lab syllabus)	20%
Class Evaluation (homework, quizzes, attendance, etc.)	10%
First Major Exam (Chapters 2 – 4 excluding Sections 4.8, 4.10 & 4.11) Week 7: Monday, February 18, 2019 (time and location will be announced later)	20%
Second Major Exam (Chapters 6 – 9 + Sections 4.8, 4.10 & 4.11) Week 13: Monday, April 1, 2019 (time and location will be announced later)	20%
Final Exam (Comprehensive) Monday, April 29, 2019 @ 7:00 PM	30%

**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
<b>Week 1</b> Jan 6-10	<b>Ch 2: Probability</b> 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
<b>Week 2</b> Jan 13-17	2-6 Independence 2-7 Bayes' Theorem <b>Ch 3: Discrete Probability Distributions</b> 3-1 Discrete Random variables 3-2 Probability Distributions and Probability Mass Functions 3-3 Cumulative Distribution Functions
<b>Week 3</b> Jan 20-24	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
<b>Week 4</b> Jan 27-31	3-8 Hypergeometric Distribution 3-9 Poisson Distribution <b>Ch 4: Continuous Probability Distributions</b> 4-1 Continuous Random Variables 4-2 Probability Distributions and Probability Density Functions
<b>Week 5</b> Feb 3-7	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution
<b>Week 6</b> Feb 10-14	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions
<b>Week 7</b> <b>EXAM 1</b> Feb 17-21	4-8 Exponential Distribution 4-10 Weibull Distribution 4-11 Lognormal Distribution
<b>Week 8</b> Feb 24-28	<b>Ch 7: Sampling Distributions</b> 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem
<b>Week 9</b> Mar 3-7	<b>Ch 8: Statistical Intervals for a Single Sample</b> 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
<b>Week 10</b> Mar 10-14	<b>Ch 9: Tests of Hypotheses for a Single Sample</b> 9-1 Hypothesis Testing 9-2.1 Tests on the Mean of a Normal Distribution with Known Variance 9-2.3 Large-Sample Test
<b>Week 11</b> Mar 17-21	9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance 9-5.1 Tests on a Population Proportion
<b>Week 12</b> Mar 24-28	<b>Ch 11: Simple Linear Regression and Correlation</b> 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
<b>Week 13</b> <b>EXAM 2</b> Mar 31-Apr 4	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation
<b>Week 14</b> Apr 7 - 11	<b>Ch 12: Multiple Linear Regression</b> 12-1 Multiple Linear Regression Model 12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression
<b>Week 15</b> Apr 14-18	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** (*Nine*) will result in a grade of **DN** in accordance with University rules.
- ✓ **Attendance** on time is *very* important.
- ✓ During examinations (quizzes, major exams, lab reports) cheating or any attempt of **cheating** by use of illegal activities, techniques and forms of fraud will result in a grade of **F** in the course along with reporting the incident to the higher university administration.

**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, 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.