

King Fahd University of Petroleum and Minerals  
Department of Mathematics and Statistics  
**STAT319: Probability and Statistics for Engineers and Scientists**  
Term 181

**Instructor:** Dr. Nasir Abbas

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**Office Hours:** 11:05 am – 12:30 pm UTR (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, 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, participation, etc.)	10%
First Major Exam (Chapters 2 – 4 excluding Sections 4.6, 4.7 & 4.11) <a href="#">Date and Time: 15-10-2018 Monday</a>	18%
Second Major Exam (Chapters 6 – 9 + Sections 4.6, 4.7 & 4.11) <a href="#">Date and Time: 19-11-2018 Monday</a>	22%
Final Exam (Comprehensive) <a href="#">Date and Time: 22-12-2018 Saturday (07:00 PM)</a>	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> Sep 02 - 06	<b>Ch 2: Probability</b> 2-1 Random Experiments, Sample Spaces, Events and Counting Techniques 2-2 Interpretations and Axioms of Probability 2-3 Addition Rules 2-4 Conditional Probability 2-5 Multiplication Rule
<b>Week 2</b> Sep 09 - 13	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> Sep 16 - 20	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> Sep 24 – 27 + Sep 29	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> Sep 30 - Oct 04	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution
<b>Week 6</b> Oct 07 – 11	4-8 Exponential Distribution 4-10 Weibull Distribution 4-6 The Normal Distribution
<b>Week 7</b> Oct 14 – 18	4-7 Normal Approximation to the Binomial and Poisson Distributions 4-11 Lognormal Distribution <div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px 0;"> <b style="color: red; font-size: 1.2em;">Major 1 on Monday 15<sup>th</sup> October</b> </div> <b>Ch 7: Sampling Distributions</b> 7-1 Point Estimation
<b>Week 8</b> Oct 21 – 25	7-2 Sampling Distributions and the Central Limit Theorem <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

<p><b>Week 9</b> Oct 28 – Nov 01</p>	<p>8-4 Large Sample Confidence Interval for a Population Proportion</p> <p><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</p>
<p><b>Week 10</b> Nov 04 - 08</p>	<p>9-2.3 Large-Sample Test 9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance</p>
<p><b>Week 11</b> Nov 11 - 15</p>	<p>9-5.1 Tests on a Population Proportion</p> <p><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</p>
<p><b>Week 12</b> Nov 18 - 22</p>	<div style="border: 1px solid black; padding: 5px; text-align: center; color: red; font-weight: bold; font-size: 1.2em;"> <b>Major 2 on Monday 19<sup>th</sup> November</b> </div> <p>11-4 Hypothesis Tests in Simple Linear Regression 11-5 Confidence Intervals 11-6 Prediction of New Observations</p>
<p><b>Week 13</b> Nov 25 - 29</p>	<p>11-7 Adequacy of the Regression Model 11-8 Correlation</p> <p><b>Ch 12: Multiple Linear Regression</b> 12-1 Multiple Linear Regression Model</p>
<p><b>Week 14</b> Dec 02 - 06</p>	<p>12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression</p>
<p><b>Week 15</b> Dec 09 - 13</p>	<p>12-4 Prediction of New Observations 12-5.1 Residual Analysis</p> <p><b>Review</b></p>

**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.
- ✓ Check **Blackboard** regularly for announcements.
- ✓ **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 problems and due date of their submission will be posted on Blackboard later.
- ✓ No late homework will be accepted.