

King Fahd University of Petroleum and Minerals  
 Department of Mathematics and Statistics  
**STAT319: Probability and Statistics for Engineers and Scientists**  
 Term 211

**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:** MINITAB, See STAT-319 Lab syllabus.

### Course Assessment

Activity	Weight
Lab Work (see lab syllabus)	18%
Classwork (The average total grade of the classwork of each section should be in the interval [8.4, 9], i.e., [70%, 75%] of 12 points.	12%
Major Exam 1 (material and date will be announced later)	20%
Major Exam 2 (material and date will be announced later)	20%
Final Exam (Comprehensive)	30%

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

## Schedule

Week	Topics	Important Dates	
<b>Week 1</b> Aug 29 – Sep 2	<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	Aug 29	Registration confirmation thru KFUPM portal; classes begin
		Sep 1	Last day for registration confirmation (4:00 PM); Last day for adding courses
<b>Week 2</b> Sep 5 – 9	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	Sep 9	Last day for dropping course(s) without permanent record
<b>Week 3</b> Sep 12 – 16	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 19 – 22 Sep 23	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	Sep 23	National Day Holiday
<b>Week 5</b> Sep 26 – 30	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution	Sep 26 - 30	Registration for Co-op in 212/213
<b>Week 6</b> Oct 3 – 7	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions		
<b>Week 7</b> Oct 10 – 14	4-8 Exponential Distribution 4-10 Weibull Distribution 4-11 Lognormal Distribution		
<b>Week 8</b> Oct 17 Oct 18 – 21	<b>Ch 7: Sampling Distributions</b> 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem	Oct 17	Student Break
<b>Week 9</b> Oct 24 – 28	<b>Ch 8: Statistical Intervals for a Single Sample</b> 8-1 Confidence Interval for the Mean of a Normal Dist. with Known $\sigma$ 8-2 Confidence Interval for the Mean of a Normal Dist. with Unknown $\sigma$ 8-4 Large Sample Confidence Interval for a Population Proportion		
<b>Week 10</b> Oct 31 – Nov 4	<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 Dist. with Known $\sigma$ 9-2.3 Large-Sample Test	Nov 4	Last day for dropping course(s) with grade of "W" thru KFUPM Portal
<b>Week 11</b> Nov 7 – 11	9-3.1 Tests on the Mean of a Normal Dist. with Unknown $\sigma$ 9-5.1 Tests on a Population Proportion		
<b>Week 12</b> Nov 14 – 18	<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> Nov 21 – 25 Nov 28 – Dec 2	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation	Nov 28 – Dec 2	Midterm Break
<b>Week 14</b> Dec 5 – 9	<b>Ch 12: Multiple Linear Regression (based on MINITAB output only)</b> 12-1 Multiple Linear Regression Model 12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression	Dec 9	Last day for major exams
<b>Week 15</b> Dec 12 – 16 <b>Week 16</b> Dec 19 - 20	12-4 Prediction of New Observations 12-6 Aspects of Multiple Regression Modeling <b>&amp; Review</b>	Dec 20	Normal Thursday Classes Last day of classes for the term

## **Important Notes:**

- **Class attendance policy:**

- ✓ Attendance on time is very important.
- ✓ Excessive unexcused absences (*nine*) will result in a grade of *DN* in accordance with University rules.

- **Missing an exam:**

*No makeup exam will be given under any circumstances, when a student misses the midterm exam for a legitimate reason (such as medical emergency), his grade for this exam will be determined based on an existing formula, which depends on his performance in the non-missed exam and the final exam.*

## **Homework Problems**

To Be Assigned later.