

King Fahd University of Petroleum and Minerals  
Department of Mathematics and Statistics  
**STAT319: Probability and Statistics for Engineers and Scientists**  
Term 201

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**Office Hours:** UTR 8:00 – 8:50 or by appointment on Microsoft Teams at [this link](#).

**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)	15%
Class Evaluation (homework, attendance, bonuses, ...)	10%
Quizzes	5%
Online test 1: Chapters 2, 3, & 4.1 – 4.5 Tuesday October 6, 2020 between 17:45 and 19:45	15%
Midterm Exam: 4.6 – 4.11 & Chapter 7 Tuesday October 20, 2020 between 20:00 and 22:00	15%
Online test 2: Chapter 8 and 9.1 Tuesday November 10, 2020 between 17:45 and 19:45	15%
Final Exam (Comprehensive) TBA	25%

### 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	Important Dates	
Week 1 Aug 30 – Sep 3	<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 30	Registration confirmation thru KFUPM portal; classes begin
		Sep 2	Last day for registration confirmation (4:00 PM); Last day for adding courses
Week 2 Sep 6 – 10	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 10	Last day for dropping course(s) without permanent record
Week 3 Sep 13 – 17	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 Sep 20 – 22	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 – 24	National Day Holidays
Week 5 Sep 27 – Oct 1	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution	Sep 27 – Oct 1	Registration for Co-op in term 202/203
Week 6 Oct 4 – 8	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions	Oct 6	Online test 1
Week 7 Oct 11 – 15	4-8 Exponential Distribution 4-10 Weibull Distribution 4-11 Lognormal Distribution		
Week 8 Oct 18 – 22	<b>Ch 7: Sampling Distributions</b> 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem	Oct 20	Midterm exam
Week 9 Oct 25 – 29	<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	Oct 29	Last day for dropping course(s) with grade of "W" thru KFUPM Portal
Week 10 Nov 1 – 5	<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		
Week 11 Nov 8 – 12	9-3.1 Tests on the Mean of a Normal Dist. with Unknown $\sigma$ 9-5.1 Tests on a Population Proportion	Nov 10	Online test 2
Week 12 Nov 15 – 19	<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		
Week 13 Nov 22 – 26	11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation		
Week 14 Nov 29 – Dec 3	<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	Dec 3	Last day for major exams; Last day for withdrawal from all courses with grade of "W" thru KFUPM Portal
Week 15 Dec 6 - 10	12-4 Prediction of New Observations 12-5.1 Residual Analysis		
Week 16 Dec 13 - 14	Normal Wednesday Normal Thursday	Dec 14	Last day of classes for the term

## Important Notes:

### ● Lectures:

Because of the current COVID-19 situation, all lectures will be conducted online using **Blackboard Collaborate Ultra** or/and **Microsoft Teams** until further notice.

#### **You need**

- ✓ a computer (desktop or laptop) with a webcam and audio capabilities with Microsoft Teams installed.
- ✓ to install Microsoft Teams on your mobile phone.
- ✓ good internet connection.
- ✓ a calculator with statistical functions.
- ✓ your book every class (soft/hard copy).
- ✓ to solve the suggested problems (will be uploaded to the blackboard at the beginning of each chapter).

### ● Class attendance policy:

- ✓ Attendance on time is very important.
  - Those who frequently face connection problems **will not be** considered present.
  - The student **must actively participate** in the lecture to be considered present.
- ✓ Excessive unexcused absences (**nine**) will result in a grade of **DN** in accordance with University rules.

### ● Details and guidelines for Assessments:

- ✓ All assessments will be conducted online using Blackboard.
- ✓ You will be able to see it in the "Assessments / Tests" section.
- ✓ All assessments have only 10 minutes to login to the assessment (expiration period).
- ✓ We expect you to abide by all ethical rules and work individually.
- ✓ Each assessment may include more than one type of questions (MCQ, fill in the blank, solving, essays ...).
- ✓ The following table shows the dates and the time of each assessment. (You may add to your calendar).

## Homework Problems

To Be Assigned later.