

King Fahd University of Petroleum and Minerals  
 Department of Mathematics and Statistics  
**STAT319: Probability and Statistics for Engineers and Scientists**  
 Term 202

**Instructor:** Mohammad F. Saleh

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**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	5%
Online Quizzes (The average total grade of the quizzes of each section shall be in the interval $[7, 7.5]$ , i.e., $[70\%, 75\%]$ of 10 points.	10%
Midterm Exam: Chapters 2, 3, 4 & 7 & Descriptive Statistics	30%
Final Exam (Comprehensive)	40%

### Grade Assignment

Score	$\leq 87 - \leq 100$	$\leq 80 - < 87$	$\leq 75 - < 80$	$\leq 70 - < 75$	$\leq 65 - < 70$	$\leq 60 - < 65$	$\leq 55 - < 60$	$\leq 50 - < 55$	$0 - < 50$
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	
<b>Week 1</b> Jan 17 – 21	<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	Jan 17	Registration confirmation thru KFUPM portal; classes begin
		Jan 20	Last day for registration confirmation (4:00 PM); Last day for adding courses
<b>Week 2</b> Jan 24 – 28	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	Jan 28	Last day for dropping course(s) without permanent record
<b>Week 3</b> Jan 31 – Feb 4	3-4 Mean and Variance of a Discrete Random Variable 3-5 Discrete Uniform Distribution 3-6 Binomial Distribution 3-7 Geometric Distribution and Negative Binomial		
<b>Week 4</b> Feb 7 – 11	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	Feb 7 - 11	Registration for Co-op in 203/211 and Summer Training 203
<b>Week 5</b> Feb 14 – 18	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 21 – 25	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions		
<b>Week 7</b> Feb 28 – Mar 4	4-8 Exponential Distribution 4-10 Weibull Distribution 4-11 Lognormal Distribution		
<b>Week 8</b> Mar 7 – 11	<b>Ch 7: Sampling Distributions</b> 7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem		
<b>Week 9</b> Mar 14 – 18	<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> Mar 21 – 25	<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	Mar 25	Last day for dropping course(s) with grade of "W" thru KFUPM Portal
<b>Week 11</b> Mar 28 – Apr 1	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> Apr 4 – 8	<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> Apr 11 – 15	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 18 – 22	<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	Apr 22	Last day for major exams
<b>Week 15</b> Apr 25 – 29	12-4 Prediction of New Observations 12-6 Aspects of Multiple Regression Modeling	Apr 29	Last day of classes for the term - Last day before Ramadhan break

## 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 Quizzes:

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

### ● 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.