

King Fahd University of Petroleum and Minerals  
 Department of Mathematics and Statistics  
**STAT319: Probability and Statistics for Engineers and Scientists**  
 Term 193 (Online)

**INSTRUCTOR**      **Mohammad Farah Saleh**  
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**OFFICE HOURS**    **UMWR: 12:30 – 1:30 PM or by Appointment**

**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*

**Textbook:**

*Applied Statistics and Probability for Engineers by D. Montgomery and G. Runger, 6<sup>th</sup> Edition, Wiley, 2014*

**Course Activities:**

Activity	Weight
Lab Work (see Lab syllabus)	15%
Class Activities	3%
Assessments (dates and Material are in last page)	82%

**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	
<b>Week 1</b> May 31 – Jun 4	<b>Ch 2: Probability</b> 2-1 Random Experiments, Sample Spaces, Events 2-2 Interpretations and Axioms of Probability 2-3 Addition Rules 2-4 Conditional Probability 2-5 Multiplication Rule 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 3-4 Mean and Variance of a Discrete Random Variable 3-5 Discrete Uniform Distribution	Sunday, 31 May	Classes begin
		Tuesday, 2 June	Last day for registration confirmation (4:00 PM); Last day for adding courses
		<b>Thursday,</b> 4 June	<b>Assessment #1 (Ch. 2)</b>
<b>Week 2</b> Jun 7 – Jun 11	3-6 Binomial Distribution 3-7 Geometric and Negative Binomial Distributions 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 4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution	Sunday, 7 June	Last day for dropping course(s) without permanent record
		<b>Wednesday,</b> 10 June	<b>Assessment #2 (Ch. 3)</b>
<b>Week 3</b> Jun 14 – Jun 18	4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions 4-8 Exponential Distribution 4-10 Weibull Distribution 4-11 Lognormal Distribution	Monday, 15 June	Last day for dropping course(s) with grade of "W" thru KFUPM Portal*
		<b>Wednesday,</b> 17 June	<b>Assessment #3 (Descriptive)</b>
<b>Week 4</b> Jun 21– Jun 25	<b>Ch 7: Sampling Distributions</b> 7-1 Point Estimation 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 8-4 Large Sample Confidence Interval for a Population Proportion	<b>Wednesday,</b> 24 June	<b>Assessment #4 (Ch.4)</b>
<b>Week 5</b> Jun 28 – Jul 2	<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 9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance 9-5.1 Tests on a Population Proportion  <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	Monday, 29 June	Last day for dropping all courses with grade of "W" thru KFUPM Portal*
		<b>Wednesday,</b> 1 July	<b>Assessment #5 (Ch. 7 &amp;8)</b>
<b>Week 6</b> Jul 4 – Jul 9	11-4 Hypothesis Tests in Simple Linear Regression 11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation  <b>Ch 12: Multiple Linear Regression</b> 12-1 Multiple Linear Regression Model	Saturday, 4 July	Normal Monday Classes
		<b>Wednesday,</b> 8 July	<b>Assessment #6 (Ch.9)</b>
<b>Week 7</b> Jul 12 – Jul 16	12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression 12-4 Prediction of New Observations 12-5.1 Residual Analysis 12-5.2 Influential Observations (Optional)	Monday, 13 July	Last day for major exams; Last day for withdrawal from all courses "WP/WF" thru the University Registrar Office
		<b>Wednesday,</b> 15 July	<b>Assessment #7 (Ch.11)</b>
<b>Week 8</b> Jul-19	Review	Sunday, 19 July	Assessment #8 (Ch.12)

## Important Notes:

### ● Lectures:

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

#### **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 (*Six*) will result in a grade of **DN** in accordance with University rules.

### ● Details and guidelines for Assessments:

- ✓ All assessments will be conducted online using the blackboard.
- ✓ You will be able to see it in the "Assessments / Tests" section.
- ✓ All assessments will **start exactly at 7:30 PM**, and you have only 10 minutes to login to the assessment.
  - It means **after 7:40 PM you cannot login** to take the assessment.
- ✓ 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)

Assessment	Week, Date, Time	Material	Weight
1	Week # 1, <b>Thu</b> Jun 04 at 7:30 PM	Chapter 2: <b>Probability</b>	10%
2	Week # 2, Wed Jun 10 at 7:30 PM	Chapter 3: <b>Discrete Probability Distributions</b>	12%
3	Week # 3, Wed Jun 17 at 7:30 PM	<b>Descriptive Statistics</b>	4%
4	Week # 4, Wed Jun 24 at 7:30 PM	Chapter 4: <b>Continuous Probability Distributions</b>	12%
5	Week # 5, Wed Jul 01 at 7:30 PM	Chapters 7: <b>Sampling Distributions</b> + Chapters 8: <b>Statistical Intervals for a Single Sample</b>	12%
6	Week # 6, Wed Jul 08 at 7:30 PM	Chapter 9: <b>Tests of Hypotheses for a Single Sample</b>	10%
7	Week # 7, Wed Jul 15 at 7:30 PM	Chapter 11: <b>Simple Linear Regression and Correlation</b>	12%
8	Week**= # 8, <b>Sun</b> Jul 19 at 7:30 PM	Chapter 12: <b>Multiple Linear Regression</b>	10%