

King Fahd University of Petroleum and Minerals  
Mathematics Department  
**STAT319: Probability and Statistics for Engineers and Scientists**  
Term 213

**Instructor:**

**Office:**

**Phone:**

**E-mail:**

**Office Hours:**

**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

**Software Package:** See STAT-319 Lab syllabus.

**Grading Policy**

Assessment	Date	Material	Weight
Exam 1 (18 MCQ)	<b>Major 1, 21<sup>st</sup> June</b>	Chapters 2, 3 + Descriptive Statistics	22.5% (90 points)
Exam 2 (18 MCQ)	<b>Major 2, 20<sup>th</sup> July</b>	Chapters 4, 7, 8	22.5% (90 points)
Final Exam (24 MCQ)	<b>TBA</b>	Comprehensive	30% (120 points)
homework	Homework on Blackboard		5% (20 points)
Quizzes	The average total grade of the quizzes of each section shall be in the interval [14, 15], i.e., [70%, 75%] of 20 points.		5% (20 points)
Lab Work (See Lab syllabus)	The average total grade of the lab of each section shall be in the interval [42, 45], i.e., [70%, 75%] of 60 points.		15% (60 points)
Total			400

**Academic Integrity:**

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

### Schedule

Week	Topics	Suggested Problems
<b>Week 1</b> June 05 – 09	<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 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	<b>Chapter #2</b> 8, 25, 37, 42, 55, 63, 77, 88, 102, 108, 125, 141, 149, 153 and 172
<b>Week 2</b> June 12 – 16	3-3 Cumulative Distribution Functions 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 distribution 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>Chapter # 3</b> 3, 5, 12, 17, 23, 37, 42, 58, 65, 85, 109, 122, and 137.
<b>Week 3</b> June 19 – 23	4-3 Cumulative Distribution Functions 4-4 Mean and Variance of a Continuous Random Variable 4-5 Continuous Uniform Distribution 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	<b>Chapter # 4</b> 4, 10, 14, 23, 35, 43, 49, 51, 53, 61, 68, 70, 83, 87, 99, 105, 131 and 141
<b>Week 4</b> June 26 – 30	<b>Ch 7: Sampling Distribution</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 $\sigma^2$ 8-1.1 Development Of The Confidence Interval and Its Basic Properties 8-1.2 Choice Of Sample Size 8-1.5 Large-Sample Confidence Interval for $\mu$ 8-2 Confidence Interval for the Mean of a Normal Distribution with Unknown $\sigma^2$ 8-4 Large Sample Confidence Interval for a Population Proportion	<b>Chapter # 7</b> 3, 7, 10 and 12.  <b>Chapter # 8</b> 4, 7, 11, 27, 35, 40 and 58.
<b>Week 5</b> July 17 – 21	<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	<b>Chapter# 9</b> 5, 9, 26, 40, 66, 67, 90 and 93.  <b>Chapter #11</b> 2, 8, 24, 44 and 70.
<b>Week 6</b> July 24 – 28	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	
<b>Week 7</b> July 31 – Aug 4	12-2 Hypothesis Tests in Multiple Linear Regression 12-3 Confidence Intervals in Multiple Linear Regression 12-4 Prediction of New Observations 12-6 Aspect of Multiple Regression Modeling	
<b>Week 8</b> Aug 7 – 8	12-6 (continue) Aspect of Multiple Regression Modeling	

**Remarks:****1. Mobiles and Smart Watches**

- Students are not allowed to use mobiles for any purpose during class time.
- Students who want to use electronic devices to take notes must take permission from their instructor.
- Violations of these rules will result in a penalty decided by the instructor.
- Academic Integrity: All KFUPM policies regarding ethics apply to this course. See the Undergraduate Bulletin.
- **Students are not allowed to carry mobile phones and smart watches to the exam halls.**

**2. Cheating in Exams:**

Cheating or any attempt of cheating by use of illegal activities, techniques and forms of fraud will result in a grade of **F** in the course along with reporting the incident to the higher university administration for further action. Cheating in exams includes (but is not limited to):

- looking at the papers of other students
- talking to other students
- **using mobiles or any other electronic devices including smart watch.**

**3. Missing an Exam:**

In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he must bring an official excuse from Students Affairs. Otherwise, he will get zero in the missed exam.

**4. Attendance:**

Students are expected to attend all lecture classes.

- If a student misses a class, he is responsible for any announcement made in that class.
- A DN grade will be awarded to any student who accumulates
  - 20% unexcused absences (9 lectures and labs)
  - 33% excused and unexcused absences (15 lectures and labs)

**5. Homework:**

- 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.
- No late homework will be accepted.

**6. Tips on how to enhance your problem-solving abilities:**

- Do all homework assignments on time.
- Practice (but not memorize) more problems than those in the above list.
- Solve review problems available at the end of each chapter.
- Solve the problems on your own before reading the solution or asking for help.
- If you find it difficult to handle a certain type of problems, you should try more problems of the same type.
- Practicing homework problems and reviewing the class lectures will make exam problems easier to tackle.
- Try to make good use of the office hours of your instructor. Always bring partial solutions of the questions that you want to discuss with your instructor.