King Fahd University of Petroleum & Minerals

Mathematics & Statistics Department

STAT319: Probability and Statistics for Engineers and Scientists
Coordinator: Dr. Monjed H. Samuh
Term 152

Instructor	:	**Name:** Muhammad Riaz
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Office	:	Bld 5 Room 332.
Office Hours	:	UTR 11:00-12:30 or by appointment (via email).
Class Schedule	:	UTR 9:00-9:50, Bld 59 Room 1013.

Textbook D. Montgomery and G. Runger (2014). **Applied Statistics and Probability for Engineers** (6^{th} ed.), Wiley.

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.

Intended Learning Outcomes After the completion of this course, students should acquire/learn

1. A thorough understanding of descriptive statistics, both graphical and numerical;
2. A working knowledge of sample spaces, events, and operations on events;
3. Elementary probability concepts;
4. A good understanding of random variables and their means and variances;
5. Basic discrete and continuous random variables;
6. The concept of a sampling distribution, and the central limit theorem;
7. Point and interval estimation of means and proportions;
8. Basic concepts of hypothesis testing including the hypothesis testing setup, procedure, p-values;
9. Correlation;
10. Simple linear regression, including estimation and testing of model parameters.

Course Policies

- Please do the reading from the sections to be covered before coming to class each day. Your instructor will be planning class activities assuming you have done the reading.
- Please bring your book to every class, as well as a calculator with statistical functions.
- **Homework**:
  1. 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.
  2. Homework is due in class on **the first Sunday after completing a chapter**.
  3. No late homework will be accepted.
  4. You may collaborate on homework, but you must write your submitted work in your own words. All steps are required, this includes showing calculations, derivations, and proofs.
- You have to devote to this class several hours per week of concentrated attention to understand the subject enough so that standard problems become routine. If you think that coming to class and reading the examples while also doing something else is enough, you're in for an unpleasant surprise on the exams.
- Attending classes is compulsory; according to the University regulations, 8 or more unexcused absences will earn you a grade of **DN**.
- In the event that a student has to miss a class, he is responsible to get caught up with the materials covered and homework assigned.
- All students are expected to be in the classroom on time. Being late will be treated as being absent.
- It is the **student's responsibility to observe the academic calendar for important dates**.
- It is the **student's responsibility to be knowledgeable about the rules and regulations that govern your study at the university**.
- I assume, the students come to class to learn, I come to class to teach.
  - We will be respectful of everyone in class.
  - Mobiles should be turned off before the beginning of each class, no exceptions.
  - There will be no talking in class, except to ask instructor questions or share comments with the entire class. Talking is disruptive to the class and disrespectful to the Instructor.
  - There will be no texting, reading, eating, etc., while in class.
- Cheating will be dealt with according to the University rules.

Software Package The Student Edition of **STATISTICA** with a Lab Manual. A Lab syllabus is available with your lab instructor.

Grade Distribution

- Your final grade will depend on the following components with these proportions:
  - **Assignments and Quizzes** (10%).
  - **Lab Work** (20%): See Lab syllabus
  - **First Exam** (10%): Chapters 2 and 3.
    5^{th} Week: At 6:30 PM, Feb. 20, 2016 (Saturday).
  - **Second Exam** (15%): Chapters 4, 7, and Descriptive Statistics from Lab.
    9^{th} Week: At 6:30 PM, Mar. 26, 2016 (Saturday).
  - **Third Exam** (15%): Chapters 8, 9, and 10.
    14^{th} Week: At 6:30 PM, Apr. 27, 2016 (Wednesday).
  - **Final Exam** (30%): Comprehensive.
    As per the official schedule: 8:00 AM, May 11, 2016 (Wednesday).
- You need to achieve at least 50% in order to pass the course.
- **Grading Scale**

Score	87-100	80-86	75-79	70-74	65-69	60-64	55-59	50-54
Grade	A+	A	B+	B	C+	C	D+	D

Homework Problems Following are the home work problems for all the chapters to be covered in STAT 319 course. Students are required to submit the solutions to these HW problems after each chapter is completed in class lecture. The specific deadlines for each chapter will be the following **SUNDAY** after we have completed a chapter in our class lecture. Note that all the HW problems are selected from the textbook used in this course.

- **Ch. 2**: 14, 25, 37, 42, 55, 63, 77, 88, 102, 108, 125, 141, 149, 153, 172.
- **Ch. 3**: 3, 5, 12, 17, 23, 37, 42, 58, 65, 85, 109, 122, 137.
- **Ch. 4**: 4, 10, 14, 23, 35, 43, 49, 51, 53, 61, 68, 70, 83, 87, 99, 105.
- **Ch. 6**: 12, 14, 35, 37, 46, 55, 56.
- **Ch. 7**: 3, 7, 10, 12.
- **Ch. 8**: 4, 7, 11, 27, 35, 40, 58.
- **Ch. 9**: 5, 9, 26(a), 40, 66, 67, 90, 93.
- **Ch. 10**: 4(a-c), 17, 19, 20, 40(b), 44, 69.
- **Ch. 11**: 8, 27, 44, 70.

Schedule of Topics Topics to be covered are:

Chapter	Section	Week
Ch 2: Probability	2.1 Sample Space and Events 2.2 Axioms of Probability 2.3 Addition Rule 2.4 Conditional Probability	Week 1: Jan. 17 - Jan. 21
	2.5 Multiplication Rule 2.6 Independence 2.7 Bayes' Theorem	
Ch 3: Discrete Probability Distributions	3.1 Discrete Random variables 3.2 Probability Mass Functions 3.3 Cumulative Distribution Functions	Week 2: Jan. 24 - Jan. 28
	3.4 Mean and Variance 3.5 Discrete Uniform Distribution 3.6 Binomial Distribution 3.7 Geometric Distribution	Week 3: Jan. 31 - Feb. 4
	3.8 Hypergeometric Distribution 3.9 Poisson Distribution	
Ch 4: Continuous Probability Distributions	4.1 Continuous Random Variables 4.2 Probability Density Functions	Week 4: Feb. 7 - Feb. 11
	4.3 Cumulative Distribution Functions 4.4 Mean and Variance 4.5 Continuous Uniform Distribution	Week 5: Feb. 14 - Feb. 18
	4.6 The Normal Distribution 4.7 Normal Approximation to the Binomial and Poisson Distribution 4.8 Exponential Distribution	Week 6: Feb. 21 - Feb. 25
Ch 7: Sampling Distributions	7.1 Point Estimation 7.2 Sampling Distributions and the Central Limit Theorem	Week 7: Feb. 28 - Mar. 3
Ch 8: Statistical Intervals for a Single Sample	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	Week 8: Mar. 6 - Mar. 10
	8.4 Large Sample Confidence Interval for a Population Proportion	
Mar. 13 - Mar. 17 : Spring Vacation		
Ch 10A: Statistical Inference for Two Samples	10-1.3 Intervals on the Difference in Means of Two Normal Distributions with Known Variances	Week 9: Mar. 20 - Mar. 24
	10-2.3 Intervals on the Difference in Means of Two Normal Distributions with Unknown Variances 10-6.3 Large Sample Intervals on the Difference in Population Proportions	Week 10: Mar. 27 - Mar. 31
Ch 9: Tests of Hypotheses for a Single Sample	9.1 Hypothesis Testing 9.2.1 Tests on the Mean of a Normal Distribution with Known Variance 9.3.1 Tests on the Mean of a Normal Distribution with Unknown Variance	Week 11: Apr. 3 - Apr. 7
	9.5.1 Tests on a Population Proportion	
Ch 10B: Statistical Inference for Two Samples	10-1.1 Tests on the Difference in Means of Two Normal Distributions with Known variances 10-2.1 Tests on the Difference in Means of Two Normal Distributions with Unknown Variances	Week 12: Apr. 10 - Apr. 14
	10.4 Paired t-test 10-6.1 Large Sample Tests on the Difference in Population Proportions	Week 13: Apr. 17 - Apr. 21
Ch 11: Simple Linear Regression and Correlation	11.2 Simple Linear Regression 11.4 Hypothesis Tests in Simple Linear Regression	Week 14: Apr. 24 - Apr. 28
	11.5 Confidence Intervals 11.6 Prediction of New Observations	Week 15: May 1 - May 5
	11.8 Correlation Review	Week 16: May 8 - May 12