King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics

STAT319: Probability and Statistics for Engineers and Scientists
Spring Semester (Term 132)

Instructor: Raid F. Anabosi   **Office:** 5-416
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Office Hours: UTR. 10:00 am - 10:50 am, 12:10 pm – 1:00 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 linear regression, including estimation and testing of model parameters
  ➢ Basic Concepts of multiple linear regression

Text: Applied Statistics and Probability for Engineers by D. Montgomery and G. Runger, 5th Edition, Wiley, 2011.

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

Assessment*

Activity	Weight
Class work	10%
Lab Work (see Lab syllabus)	20%
First Major Exam (Chapters 2, 3 and 4) Monday March 10, 2014, 6:15 pm	15%
Second Major Exam (Chapters 7 and 8 + Descriptive Statistics from Lab) Monday April 7, 2014, 6:30 pm	15%
Third Major Exam (Chapters 9 and 10) Monday May 5, 2014, 6:30 pm	15%
Final Exam (Comprehensive) Monday May 26, 2014, 8:00 am	25%

Grade Assignment

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

Academic Integrity: All KFUPM policies regarding **ethics** and **academic honesty** apply to this course.
Important Notes:
  ✓ Please bring your book to every class, as well as a calculator with statistical functions.
  ✓ Excessive unexcused absences will result in a grade of ***DN*** in accordance with University rules.
  ✓ ***Attendance*** on time is ***very*** important.

Home Work:
- ✓ 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.
- ✓ Homework is due <u>in class</u> on the first Sunday after completing a chapter.
- ✓ No late homework will be accepted.
- ✓

Schedule

WEEK	Topics	Reminders

Week 1
January 26 –30
	Ch 2: Probability
	  2.1 Sample Space and Events
	  2.2 Axioms of Probability
	  2.3 Addition Rule
	  2.4 Conditional Probability	

Week 2
February 2 – 6
	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
		Thursday February 6
		➤ Last day for dropping course(s) without permanent record

Week 3
February 9 – 13
	3.4 Mean and Variance
	  3.5 Discrete Uniform Distribution
	  3.6 Binomial Distribution
	  3.7 Geometric Distribution	

Week 4
February 16 – 20
	3.8 Hypergeometric Distribution
	  3.9 Poisson Distribution
	
	Ch 4: Continuous Probability Distributions
	  4.1 Continuous Random Variables
	  4.2 Probability Density Functions
	  4.3 Cumulative Distribution Functions	

Week 5
February 23 – 27
	4.4 Mean and Variance
	  4.5 Continuous Uniform Distribution
	  4.6 The Normal Distribution
	  4.7 Normal Approximation to the Binomial and Poisson Distribution	

Week 6 March 2 – 6	4.8 Exponential Distribution **Ch 7: Sampling Distributions** 7.1 Point Estimation	Monday March 2 ➤ Start of midterm grade reporting, for a period of two weeks. Thursday March 6 ➤ Last day for dropping course(s) with grade of "W" thru Internet
Week 7 March 9 – 13	7.2 Sampling Distributions and the Central Limit Theorem	

Week 8
March 16 – 20
	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	
March 23 – 27	**Midterm Vacation**	

Week 9
March 30 – April 3
	8.4 Large Sample Confidence Interval for a
	     Population Proportion
	Ch 10: Statistical Inference for Two Samples
	  10-1.3 Intervals on the Difference in Means of Two
	     Normal Distributions with Known
	Variances	

Week 10
April 6 – 10
	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
		Thursday April 10
		➤ Last day for
		  withdrawal from <u>all</u>
		  <u>courses</u> with grade of
		  "W" thru the Univ
		  Registrar Office

Week 11
April 13 – 17
	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
		Sunday April 13
		➤ Beginning of Early
		  Registration
		➤ Beginning of
		  registration for Coop
		  and Summer Training

Week 12
April 20 – 24
	9.5.1 Tests on a Population Proportion
	
	**Ch 10: Statistical Inference for Two Samples
	Continued**
	  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 13 April 27 – May 1	10.4 Paired t-test 10-6.1 Large Sample Tests on the Difference in Population Proportions	

Week 14
May 4 – 8
	Ch 11: Simple Linear Regression and Correlation
	  11.2 Simple Linear Regression
	  11.4 Hypothesis Tests in Simple Linear Regression
		Thursday May 8
		➤ Last day for major
		  exams
		➤ Last day for
		  withdrawal from <u>all</u>
		  <u>courses</u> with grade of
		  "WP/WF" thru the
		  University Registrar
		  Office

Week 15 May 11 – 15	11.5 Confidence Intervals 11.6 Prediction of New Observations 11.8 Correlation	