

King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics
STAT319: Probability and Statistics for Engineers and Scientists
Term 163

Instructor: Dr. Nasir Abbas

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Office Hours: 10:55 – 11:55 am MWR (tentative)

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, 6th Edition, Wiley, 2014

Software Package: See STAT-319 Lab syllabus.

Assessment*

Activity	Weight
Class Evaluation (homework, quizzes, attendance, etc.)	10%
Lab Work (see Lab syllabus)	20%
First Major Exam (Chapters 2 – 4 excluding Sections 4.6, 4.7 & 4.11) Date and Time: 24-07-2017 Monday (7:00 PM)	15%
Second Major Exam (Chapters 6 – 9 + Sections 4.6, 4.7 & 4.11) Date and Time: 08-08-2017 Tuesday (7:00 PM)	20%
Final Exam (Comprehensive) Date: 23-08-2017 Wednesday (8:00 AM)	35%

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
<p style="text-align: center;">Week 1</p> <p style="text-align: center;">July 9 – 13 + July 15</p>	<p>Ch 2: Probability</p> <p>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 2-6 Independence 2-7 Bayes' Theorem</p> <p>Ch 3: Discrete Probability Distributions</p> <p>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</p>
<p style="text-align: center;">Week 2</p> <p style="text-align: center;">July 16 – 20</p>	<p>3-5 Discrete Uniform Distribution 3-6 Binomial Distribution 3-7-1 Geometric Distribution Only 3-8 Hypergeometric Distribution 3-9 Poisson Distribution</p> <p>Ch 4: Continuous Probability Distributions</p> <p>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 4-8 Exponential Distribution</p>
<p style="text-align: center;">Week 3</p> <p style="text-align: center;">July 23 – 27</p>	<p>4-10 Weibull Distribution</p> <div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px 0;"> <p style="color: red; font-weight: bold; font-size: 1.2em;">Major 1 on Monday 24th July</p> </div> <p>4-6 The Normal Distribution 4-7 Normal Approximation to the Binomial and Poisson Distributions 4-11 Lognormal Distribution</p> <p>Ch 7: Sampling Distributions</p> <p>7-1 Point Estimation 7-2 Sampling Distributions and the Central Limit Theorem</p>
<p style="text-align: center;">Week 4</p> <p style="text-align: center;">July 30 – August 03</p>	<p>Ch 8: Statistical Intervals for a Single Sample</p> <p>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</p> <p>Ch 9: Tests of Hypotheses for a Single Sample</p> <p>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</p>

<p>Week 5 August 06 – 10</p>	<div style="border: 1px solid black; padding: 5px; text-align: center; color: red; font-weight: bold; font-size: 1.2em;"> Major 2 on Tuesday 8th August </div> <p>Ch 11: Simple Linear Regression and Correlation 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 11-5 Confidence Intervals 11-6 Prediction of New Observations 11-7 Adequacy of the Regression Model 11-8 Correlation</p>
<p>Week 6 August 13 – 17</p>	<p>Ch 12: Multiple Linear Regression 12-1 Multiple Linear Regression Model 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)</p>
<p>Week 7 August 20 + August 23</p>	<p>Review</p> <div style="border: 1px solid black; padding: 5px; text-align: center; color: red; font-weight: bold; font-size: 1.2em;"> Final Exam on Wednesday 23rd August </div>

Important Notes:

- ✓ Please bring your book to every class, as well as a calculator with statistical functions.
- ✓ Excessive unexcused absences (**07**) 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.
- ✓ No late homework will be accepted.

Homework Problems

Homework # 1 (Due date Sunday 16-07-2017):

Ch. 2: 8, 25, 37, 42, 55, 63, 77, 88, 102, 108, 125, 141, 149, 153 and 172.

Ch. 3: 3, 5, 12, 17, 23, 37 and 42

Homework # 2 (Due date Sunday 23-07-2017)

Ch. 3: 58, 65, 85, 109, 122, and 137.

Ch. 4: 4, 10, 14, 23, 35 and 43.

Homework # 3 (Due date Sunday 30-07-2017)

Ch. 4: 49, 51, 53, 61, 68, 70, 83, 87, 99, 105, 131 and 141.

Ch. 6: 12, 14, 35, 37, 46, 55 and 56.

Homework # 4 (Due date Sunday 06-08-2017)

Ch. 7: 3, 7, 10 and 12.

Ch. 8: 4, 7, 11, 27, 35, 40 and 58.

Homework # 5 (Due date Sunday 13-08-2017)

Ch. 9: 5, 9, 26(a), 40, 66, 67, 90 and 93.

Ch. 11: 2, 8, 24, 44 and 70.