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 **Office:** 5 - 312
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**Office Hours: 11:00 – 12:00 am UMW (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)<br>Date and Time: 24-07-2017 Monday (7:00 PM) | 15% |
| Second Major Exam (Chapters 6 – 9 + Sections 4.6, 4.7 & 4.11)<br>Date and Time: 08-08-2017 Tuesday (7:00 PM) | 20% |
| Final Exam (Comprehensive)<br>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 |
|---|---|
| **Week 1**<br><br>July 9 – 13<br>+<br>July 15 | **Ch 2: Probability**<br>2-1.1 2-1.3Random Experiments, Sample Spaces and Events<br>2-2 Interpretations and Axioms of Probability<br>2-3 Addition Rules<br>2-4 Conditional Probability<br>2-5 Multiplication Rule<br>2-6 Independence<br>2-7 Bayes' Theorem<br><br>**Ch 3: Discrete Probability Distributions**<br>3-1 Discrete Random variables<br>3-2 Probability Distributions and Probability Mass Functions<br>3-3 Cumulative Distribution Functions<br>3-4 Mean and Variance of a Discrete Random Variable |
| **Week 2**<br><br>July 16 – 20 | 3-5 Discrete Uniform Distribution<br>3-6 Binomial Distribution<br>3-7-1 Geometric Distribution Only<br>3-8 Hypergeometric Distribution<br>3-9 Poisson Distribution<br><br>**Ch 4: Continuous Probability Distributions**<br>4-1 Continuous Random Variables<br>4-2 Probability Distributions and Probability Density Functions<br>4-3 Cumulative Distribution Functions<br>4-4 Mean and Variance of a Continuous Random Variable<br>4-5 Continuous Uniform Distribution<br>4-8 Exponential Distribution |
| **Week 3**<br><br>July 23 – 27 | 4-10 Weibull Distribution<br><br>**Major 1 on Monday 24th July**<br><br>4-6 The Normal Distribution<br>4-7 Normal Approximation to the Binomial and Poisson Distributions<br>4-11 Lognormal Distribution<br><br>**Ch 7: Sampling Distributions**<br>7-1 Point Estimation<br>7-2 Sampling Distributions and the Central Limit Theorem |
| **Week 4**<br><br>July 30 –<br>August 03 | **Ch 8: Statistical Intervals for a Single Sample**<br>8-1 Confidence Interval for the Mean of a Normal Distribution with Known Variance<br>8-2 Confidence Interval for the Mean of a Normal Distribution with Unknown Variance<br>8-4 Large Sample Confidence Interval for a Population Proportion<br><br>**Ch 9: Tests of Hypotheses for a Single Sample**<br>9-1 Hypothesis Testing<br>9-2.1 Tests on the Mean of a Normal Distribution with Known Variance<br>9-2.3 Large-Sample Test<br>9-3.1 Tests on the Mean of a Normal Distribution with Unknown Variance<br>9-5.1 Tests on a Population Proportion |

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|---|---|
| **Week 5**<br><br>August 06 – 10 | **Major 2 on Tuesday 8th August**<br><br>**Ch 11: Simple Linear Regression and Correlation**<br>11-1 Empirical Models<br>11-2 Simple Linear Regression<br>11-3 Properties of the least squares estimators<br>11-4 Hypothesis Tests in Simple Linear Regression<br>11-5 Confidence Intervals<br>11-6 Prediction of New Observations<br>11-7 Adequacy of the Regression Model<br>11-8 Correlation |
| **Week 6**<br><br>August 13 – 17 | **Ch 12: Multiple Linear Regression**<br>12-1 Multiple Linear Regression Model<br>12-2 Hypothesis Tests in Multiple Linear Regression<br>12-3 Confidence Intervals in Multiple Linear Regression<br>12-4 Prediction of New Observations<br>12-5.1 Residual Analysis<br>12-5.2 Influential Observations (Optional) |
| **Week 7**<br><br>August 20<br>+<br>August 23 | **Review**<br><br>**Final Exam on Wednesday 23rd August** |

***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.