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

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Office Hours (Tentative): UTR. 09:00 am – 10:00 am, 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


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

<table>
<thead>
<tr>
<th>Activity</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Class work</td>
<td>10%</td>
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<tr>
<td>Lab Work (see Lab syllabus)</td>
<td>20%</td>
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<tr>
<td>First Major Exam 4th week: Wednesday, Sept. 16, 17:00 – 18:30 in OAB</td>
<td>10%</td>
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<td>Second Major Exam 9th week: Wednesday, Oct. 28, 7:00 – 18:30 in OAB</td>
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<tr>
<td>Third Major Exam 13th week: Wednesday, Nov. 25, 7:00 – 18:30 in OAB</td>
<td>15%</td>
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<td>Final Exam (Comprehensive): Tuesday, December 22, 2015 , 12:30pm-2:30pm</td>
<td>30%</td>
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Grade Assignment

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<tr>
<th>Score</th>
<th>87 – 100</th>
<th>80 – 86</th>
<th>75 – 79</th>
<th>70 – 74</th>
<th>65 – 69</th>
<th>60 – 64</th>
<th>55 – 59</th>
<th>50 – 54</th>
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<tr>
<td>Grade</td>
<td>A+</td>
<td>A</td>
<td>B+</td>
<td>B</td>
<td>C+</td>
<td>C</td>
<td>D+</td>
<td>D</td>
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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 in class on the first Sunday after completing a chapter.
- No late homework will be accepted.
<table>
<thead>
<tr>
<th>WEEK</th>
<th>Topics</th>
<th>Reminders</th>
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| **Week 1** 23/8 – 27/8 | **Ch 2: Probability**  
2.1 Sample Space and Events  
2.2 Axioms of Probability  
2.3 Addition Rule  
2.4 Conditional Probability |  |
| **Week 2** 30/8 – 03/9 | 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 3** 06/9 – 10/9 | 3.4 Mean and Variance  
3.5 Discrete Uniform Distribution  
3.6 Binomial Distribution  
3.7 Geometric Distribution |  |
| **Week 4** 13/9 – 17/9 | 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 | Major 1  
Wednesday, Sept. 16, 17:00 – 18:30 in OAB  
18/9 – 28/9 Ied Al-Adha vacation  |
| **Week 5** 29/9 – 5/10 | 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** 6/10 – 12/10 | 4.8 Exponential Distribution  
**Ch 7: Sampling Distributions**  
7.1 Point Estimation |  |
| **Week 7** 13/10 – 19/10 | 7.2 Sampling Distributions and the Central Limit Theorem |  |
| **Week 8** 20/10 – 26/10 | **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 9** 27/10 – 02/11 | 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 | Major 2  
Wednesday, Oct. 28, 7:00 – 18:30 in OAB |
| Week 10  | 3/11 – 9/11 | 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 11  | 10/11 – 16/11 | **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 12  | 17/11 – 23/11 | 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  | 24/11 – 30/11 | 10.4 Paired t-test  
10-6.1 Large Sample Tests on the Difference in Population Proportions | **Major 3**  
Wednesday, Nov. 25, 7:00 – 18:30 in OAB |
| Week 14  | 1/11 – 7/12 | **Ch 11: Simple Linear Regression and Correlation**  
11.2 Simple Linear Regression  
11.4 Hypothesis Tests in Simple Linear Regression |
| Week 15  | 8/12 – 14/12 | 11.5 Confidence Intervals  
11.6 Prediction of New Observations  
11.8 Correlation |
Homework Problems

Following are the homework 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:** 8, 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.