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

**STAT319: Probability and Statistics for Engineers and Scientists**
Spring Semester (Term 141)

**Instructor**: Walid S. Al-Sabah
**Office:** 5-330 **Phone:** 4197 **Email**: walid@kfupm.edu.sa
**Office Hours:** UTR 12:15 – 1:00 pm
Wednesday 10:00 – 11:00 am

**Class Meeting Times:** UTR 1:10 – 2:00

**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 and 3) Wednesday October 15, 2014, 18:00 | 10% |
| Second Major Exam (Chapters 4, 7, and Descriptive Statistics from Lab) Wednesday November 5, 2014, 17:30 | 15% |
| Third Major Exam (Chapters 8, 9, and 10) Wednesday December 17, 2014, 17:30 | 15% |
| Final Exam (Comprehensive) Thursday January 1, 2015, 8:00 am | 30% |

**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 in class on the first Sunday after completing a chapter.
- ✓ No late homework will be accepted.

**Schedule**

| WEEK | Topics | Reminders |
|---|---|---|
| **Week 1**<br>**31/8 – 4/9** | **Ch 2: Probability**<br>2.1 Sample Space and Events<br>2.2 Axioms of Probability<br>2.3 Addition Rule<br>2.4 Conditional Probability | |
| **Week 2**<br>**7/9 – 11/9** | 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 Mass Functions<br>3.3 Cumulative Distribution Functions | Thursday September 11<br>➢ Last day for dropping course(s) without permanent record |
| **Week 3**<br>**14/9 – 18/9** | 3.4 Mean and Variance<br>3.5 Discrete Uniform Distribution<br>3.6 Binomial Distribution<br>3.7 Geometric Distribution | |
| **Week 4**<br>**21/9 – 25/9** | 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 Density Functions<br>4.3 Cumulative Distribution Functions | Tuesday September 23<br>➢ National Day - Holiday |
| **28/9 – 9/10 Ied Al–Adha vacation** | | |
| **Week 5**<br>**12/10 – 16/10** | 4.4 Mean and Variance<br>4.5 Continuous Uniform Distribution<br>4.6 The Normal Distribution<br>4.7 Normal Approximation to the Binomial and Poisson Distribution | |
| **Week 6**<br>**19/10 – 23/10** | 4.8 Exponential Distribution<br><br>**Ch 7: Sampling Distributions**<br>7.1 Point Estimation | Sunday October 19<br>➢ Start of midterm grade reporting, for a period of two weeks.<br>Thursday October 23<br>➢ Last day for dropping course(s) with grade of "W" thru Internet |

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|---|---|---|
| **Week 7**<br>**26/10 – 30/10** | 7.2 Sampling Distributions and the Central Limit Theorem | |
| **Week 8**<br>**2/11 – 6/11** | **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 | |
| **Week 9**<br>**9/11 – 13/11** | 8.4 Large Sample Confidence Interval for a Population Proportion<br>**Ch 10: Statistical Inference for Two Samples**<br>10-1.3 Intervals on the Difference in Means of Two Normal Distributions with Known Variances | |
| **Week 10**<br>**16/11 – 20/11** | 10-2.3 Intervals on the Difference in Means of Two Normal Distributions with Unknown Variances<br>10-6.3 Large Sample Intervals on the Difference in Population Proportions | Thursday November 20<br>➢ Last day for withdrawal from all courses with grade of "W" thru the Univ Registrar Office |
| **Week 11**<br>**23/11 – 27/11** | **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>9.3.1 Tests on the Mean of a Normal Distribution with Unknown Variance | |
| **Week 12**<br>**30/11 – 4/12** | 9.5.1 Tests on a Population Proportion<br>**Ch 10: Statistical Inference for Two Samples Continued**<br>10-1.1 Tests on the Difference in Means of Two Normal Distributions with Known variances<br>10-2.1 Tests on the Difference in Means of Two Normal Distributions with Unknown Variances | Sunday November 30<br>➢ Beginning of Early Registration (142)<br>➢ Beginning of registration for Coop and Summer Training |
| **Week 13**<br>**7/12 – 11/12** | 10.4 Paired t-test<br>10-6.1 Large Sample Tests on the Difference in Population Proportions | |
| **Week 14**<br>**14/12 – 18/12** | **Ch 11: Simple Linear Regression and Correlation**<br>11.2 Simple Linear Regression<br>11.4 Hypothesis Tests in Simple Linear Regression | Thursday December 18<br>➢ Last day for major exams<br>➢ Last day for withdrawal from all courses with grade of "WP/WF" thru the University Registrar Office |
| **Week 15**<br>**21/12 – 25/12** | 11.5 Confidence Intervals<br>11.6 Prediction of New Observations<br>11.8 Correlation | |
| **Week 16**<br>**28/12** | Catch-up | Sunday December 28<br>Last day of classes (Normal Tuesday |

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| | | Classes) |