KINGDOOM OF SAUDI ARABIA
Ministry of Education
Al-Imam Mohammad Ibn Saud Islamic University
College of Sciences
Department of Mathematics & Statistics

المملكة العربية السعودية
وزارة التـعـلـيـم
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الرياضيات والإحصاء

SYLLABUS

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Teaching Language
STA	**215**	**Probability and Statistics for Engineers**	**3**	**2**	**0**	**2**	**6**	**MAT 106**	**2[1]**	**English**

A. Course Description

This course describes the most important ideas, theoretical results, and examples of probability, random variables, probability distributions, joint probability distributions, random sampling and data description, and test hypothesis. The course includes the essential fundamentals of these topics. The emphasis is on calculations, and some applications are mentioned. The use of statistical packages is essential during first and seventh chapters.

B. Course Outcomes

At the end of this course the student will be able to:

- Use basic probability rules.
- Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.
- Describe discrete data graphically and compute measures of centrality and dispersion
- Be familiar with statistical estimation and tests of hypotheses.

C. References:

Required Textbook

Applied Statistics and Probability for Engineers, Douglas C. Montgomery, George C. Runger, 6th Edition, John Wiley & Sons, Inc., 2014.

Other references

- *Probability and Statistics in Engineering*, William W. Hines, Douglas C. Montgomery, David M. Goldsman, Connie M. Borror, 4th Edition, John Wiley & Sons Inc, 2003.

- *Schaum's Outline of Introduction to Probability and Statistics*, Seymour Lipschutz and Jack Schiller, 2nd Edition, McGraw Hill International Editions.

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[1] *B.Sc. of Engineering.*

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D. Topics Outline

1. **The Role of Statistics in Engineering:** The Engineering Method and Statistical Thinking: Collecting Engineering (Basic Principles, Retrospective Study, Observational Study and Designed Experiments), Mechanistic and Empirical Models, Probability and Probability Models.

2. **Probability:** Sample Spaces and Events (Random Experiments, Random Spaces, Events), Counting Techniques, Interpretations of Probability (Axioms of Probability), Additions Rules, Conditional Probability (Multiplication Rule, Total Probability Rule, Independence, Bayes' Theorem), Random Variables.

3. **Discrete Random Variables and Probability Distributions:** Probability Distributions and Probability Mass Functions, Cumulative Distribution Functions, Mean and Variance of a Discrete Random Variables.

4. **Continuous Random Variables and Probability Distributions:** Probability Distributions and Probability Density Functions, Cumulative Distribution Functions, Mean and Variance of a Continuous Random Variables, Normal Distribution and Normal Approximation to the Binomial and Poisson Distributions, Examples of Continuous Distributions (Exponential Distribution, Gamma Distribution, Erlang Distribution, Weibull Distribution, Lognormal Distribution).

5. **Joint Probability Distributions:** Two Discrete Random Variables: (Joint Probability Distributions, Marginal Probability Distributions), Two Discrete Random Variables, Conditional Probability Distributions, Independence, Linear Combinations of Random Variables.

6. **Random Sampling and Data Description:** Data Summary and Display, Random Sampling Steam and Leaf Diagrams, Frequency Distributions and Histograms, Box Plots, Time Sequence Plots, Probability Plots.

7. **Point Estimation of Parameters:** General Concepts of Point Estimation (Unbiased Estimator, Variance of Point Estimator, Mean Square Error of an Estimator), Method of Moments of Point Estimator, Method of Maximum Likelihood.

8. **Tests of Hypotheses:** Hypotheses Testing Statistical Hypotheses, Tests of Statistical Hypotheses, General Procedure for Hypotheses Tests.

9. **Simple Linear Regression:** Introduction to Linear Regression, The Simple Linear Regression Model, Least Squares and the Fitted Model.

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homework:** During the semester.
- **Final Exam:** 16th week.

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Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	**Midterm 2:** 20 %	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A+	A	B+	B	C+	C	D+	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. ("Immediate family" is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams
goo.gl/ykm7t3