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| **KINGDOOM OF SAUDI ARABIA** | | | | | | | املكة العربية السعودية | | |
| **Ministry of Education** | | | | | | | وزارة التعلـيـم | | |
| Al-Imam Mohammad Ibn Saud Islamic University | | | | | | | جامعة الإمام محمد بن سعود الإسلامية | | |
| **College of Sciences** | | | | | | | كلية العلوم | | |
| **Department of Mathematics & Statistics** | | | | | | | قسم الرياضيات والإحصاء | | |

# SYLLABUS

| *Course Code* | *Course Num.* | *Course Name* | *Credit Hours* | *Lec.* | *Lab.* | *Tut.* | *Private study* | *Pre-requisites* | *Course Level* | *Teaching Language* |
|---|---|---|---|---|---|---|---|---|---|---|
| **STA** | **111** | **Introduction to Probability and Statistics** | **3** | **2** | **0** | **2** | **5** | **MAT 113** | **2[1]** | **English** |

## A. Course Description

This course describes the most important ideas, theoretical results, and examples of descriptive statistics, counting, random variables, probability distributions, simple linear regression and sampling distribution. 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
- Describe discrete data graphically and compute measures of centrality and dispersion.
- Compute probabilities by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional probability.
- Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance.
- Compute probabilities based on practical situations using the binomial and normal distributions.
- Be familiar with statistics and random samples, sampling experiments, the sampling distribution for a sample mean, and the sampling distribution of a sample proportion.

## C. References:

**Required Textbook**
*Probability & Statistics for Engineers & Scientists*, R. Walpole, R. Myers, S. Myers, K. Ye, 8th Edition, Pearson Education International, 2007.

**Other references:**
- *Introduction to Probability and Statistics*; 14th Edition, W. Mendenhall, R. J. Beaver, Barbara M. Beaver, Duxbury Press, 2013..
- *Probability and Statistics in Engineering*, 4th Edition, William W. Hines, Douglas C. Montgomery, David M. Goldsman, Connie M. Borror, John Wiley & Sons Inc, 2003.
- *Data Analysis with Microsoft Excel,* 3rd Edition, Kenneth N. Berk, Patrick Carey, Duxbury Press, 2010.

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[1] *B.Sc. in Applied Mathematics and Physics.*

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## D. Topics Outline

1. **Descriptive Statistics**: Definitions, Need of Statistics & Statistical Problem Solving Methodology & Introduction to Data Collection, Data Organization and Frequency Distributions, Graphic Presentations of Frequency Distributions, Computing Measures of Central Tendency, Computing Measures of Dispersion and Relative Position, Using Technology.

2. **Probability**: Some Basic Considerations, Events, Counting Sample Point, Interpretations of Probability, Addition Rules, Conditional Probability, Multiplication and Total Probability Rules, Independence, Bayes' Theorem.

3. **Random Variables and Probability Distribution**: Concept of Random Variable, Discrete Random Variables and Probability Distributions, Continuous Random Variables and Probability Distributions.

4. **Mathematical Expectation**: Mean of Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear combinations of Random Variables.

5. **Some Discrete Probability Distributions**: Bernoulli & Binomial Distribution, Hypergeometric Distribution, Geometric and Negative Binomial Distributions, Poisson Distribution.

6. **Some Continuous Probability Distributions**: Continuous Uniform Distribution, Gamma and Exponential Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial.

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

8. **Fundamental Sampling Distribution**: Random Sampling, Some Important Statistics. Sampling Distribution. Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of $S^2$, t-Distribution, F-Distribution

## 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.

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 % | | |

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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**

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