

## BA 327 – Statistics and Numerical Methods

### COURSE INFORMATION

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Course Title: Statistics and Numerical Methods

Code: BA 327

Contact Hours (hours/week):           Lecture – 2 Hrs.           Tutorial – 2 Hrs.           Credit – 3.

Prerequisite: (Math II) BA 124.

Course Coordinator: Dr. Mohamed Fathy Emam

### GRADING

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Class Performance/Attendance:           10%

Midterm # 1/Assignments – (7<sup>th</sup> Week):   30%

Midterm # 2/Assignments – (12<sup>th</sup> Week):   20%

Final Exam:                                   40%

### COURSE DESCRIPTION

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**1. Probability:** Introduction- Basic Definitions and tree diagram- Set Theory- Axioms and Basic Theorems of Probability- Conditional Probability – Independent Events- Sampling and Baye`s rule. **2. Random Variable and Probability Distributions:** Concept of random variable- Discrete probability distributions- Continuous probability distributions. **3. Mathematical Expectation-** Mean and variance of random variable- Mean and variance of linear combinations of random variable- Theorems of mean and variance of random variable. **4. Some Discrete Probability Distributions:** Discrete uniform distribution-Binomial distribution-Poisson distribution. **5. Continuous Probability Distributions:** Normal distribution. **6. Mathematical Statistics:** Introduction-Processing of samples- frequency table- dot diagram- grouping of samples- Mean and variance. **7. Interpolation:** Introduction-Lagrange`s interpolation Formula-Newton`s formula for forward interpolation -Newton`s formula for backward interpolation. **8. Numerical Integration and Differentiation** Numerical Integration: Rectangular rule - Trapezoidal rule-Simpson`s rule. 8.2. Numerical Differentiation: Lagrange`s three point Formula.

### TEXT BOOKS

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- Probability and Statistics for Engineers and Scientists. Ronald E. Walpole, Raymond H. Myers.
- Erwin Kreyszig, ‘Advanced Engineering Mathematics’, John Wiley, 9th edition, 2006.

### COURSE AIM

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To give student general information about the concept of probability and some methods of numerical solution (numerical method for solving equations)

## COURSE OBJECTIVES

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The student should understand: The theory of probability, concept of random variable, some special distributions, some interpolation methods, and some methods of numerical integration and differentiation.

## COURSE OUTLINE

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*Week Number 1:* Probability: Introduction- Basic Definitions and tree diagram

*Week Number 2:* Set Theory- Axioms and Basic Theorems of Probability

*Week Number 3:* Conditional Probability – Independent Events

*Week Number 4:* Sampling and Baye`s rule

*Week Number 5:* Random Variable and Probability Distributions: Concept of random variable - Discrete probability distributions.

*Week Number 6:* Continuous probability distributions

*Week Number 7:* Mathematical Expectation: Mean and variance of random variable and 7<sup>th</sup> week exam

*Week Number 8:* Mean and variance of linear combinations of random variable- Theorems of mean and variance of random variable.

*Week Number 9:* Some Discrete Probability Distributions: Discrete uniform distribution- Binomial distribution

*Week Number 10:* Poission distribution – Continuous Probability Distributions: Normal distribution

*Week Number 11:* Mathematical Statistics

*Week Number 12:* Interpolation: Introduction-Lagrange`s interpolation Formula ,12<sup>th</sup> week exam

*Week Number 13:* Newton`s formula for forward interpolation - Newton`s formula for backward interpolation

*Week Number 14:* Numerical Integration: Rectangular rule -Trapezoidal rule

*Week Number 15:* Numerical Differentiation: Lagrange`s three point Formula

*Week Number 16:* Final exam