

## **COURSE DESCRIPTION**

This course is an introduction to conducting statistical analysis in engineering applications. Students will explore statistical techniques used to analyze data and make informed decisions. The course is composed of a systematic introduction of the fundamental topics of engineering statistics, including:

- Data Characterization and Probability Theory
- Theoretical Basis for Statistical Inference
- Modeling and Algorithms
- Valuation Mechanism

### **EXPECTED LEARNING OUTCOMES**

Graduate students will develop deeper understanding of theoretical foundations of statistical inference. By taking this course, both undergraduate and graduate students will possess the capability to:

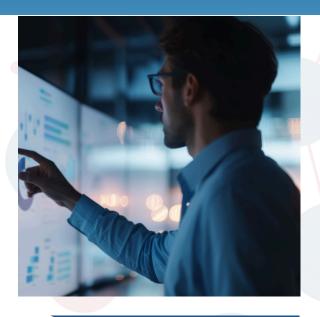
- characterize and model data.
- understand the theoretical basis for statistical inference.
- apply methods and algorithms of statistical inference on engineering problems.

For graduate Students, additional learning outcomes include:

- approaches to evaluating the inference methods and algorithms.
- development of inference methods for given engineering problems.

#### **COURSE FORMAT**

- In-Person | 15-week semester
- Tailored to your professional needs
- 3-credit hour I You may apply it towards SIE MS and PhD programs
- Prerequisites: Advanced Standing





**WEEK 11** 

▶ UMVUE

**WEEK 12** 

**WEEK 13** 

**WEEK 14** 

**WEEK 15** 

**WEEK 16** 

Exam 2

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Evaluating Point Estimators

Hypothesis Testing, LRT

Tests for Applications

Interval Estimation

Exam 2 Review

Evaluating Hypothesis Test

Size & Level of a Test, P-Value

Applications of Interval Estimation

# **COURSE SCHEDULE**

# WEEK 1

- Course Introduction and Fundamental **Data Characterization**
- Set Theory, Probability Concept and Counting Techniques

# WEEK 2

- Conditional Probability & Independence, Concept of Random Variable
- Univariate & Multivariate Distribution Model

# WEEK 3

- ► Marginal & Conditional Distribution Model
- Expectation & variance

#### WEEK 4

- Covariance & Conditional Expectation, Transformation
- Special Distributions- Discrete

#### WEEK 5

- ▶ Special Distributions- Continuous
- Exponential Family, Moment & Moment Generation Function (MGF)

### WEEK 6

- ► Function of Random Vector, Fundamental Concepts of Statistics
- Samples from Normal distribution

- Derived Distributions
- Review for Exam 1

# WEEK 8

- Order Statistics & Sufficiency Principle
- Likelihood Principle & Point Estimation

#### WEEK 9

- Practice Exam 1 Review
- Exam 1

- Method of Moment, Maximum Likelihood Estimation
- **Bayes Estimation**



Real-World Flexible/Interactive **Application** Learning



**Bridge Theory & Practice** 



**Innovative** Curriculum



**Distinguished Faculty** 



FROM EFFICIENCY TO INNOVATION—LEAD THE FUTURE OF INDUSTRIAL ENGINEERING.