Course Title: ITEX 120 Probability and Statistics   **Semester: Second**

Credit Hours: 3

Nature of the course: Theory and Practical

1. **Course Description and Goals**

This course aims to explore the application of probability and statistics for computer application. Students will use the techniques and strategies of statistical modeling and apply in computing field. The objective of the course is to provide students with a clear understanding of the basic statistical concepts and tools and to enable them to use these tools as Necessary Avenue forengineering professions and scientific knowledge.

2. **Learning Outcomes**

On completion of this course, the students will be able to:

- Relate statistics with computing

- Analyze different statistical models for data analysis

- Use the concept of probability and statistics in modeling mathematical data.

3. **TLMs:** PowerPoint slides, Video lectures, Reference book
4. **Assessment:** Project work, data analysis, Demonstration, Numerical Assignments.
1. **Introduction to Statistics and Data Description (8)**
   - Graphical Presentation of Data
     i. Dot Plots and Scatter Plots
     ii. The frequency Distribution and Histogram
     iii. The Stem-and-leaf Plot
     iv. The Box Plot
     v. The Pareto Chart
   - Numerical Description of Data
     i. Measures of Central Tendency: Mean, Median, Mode, Mean of combinedgroups, Comparison of mean, median and mode.
     ii. Measures of Dispersion: Range, Quartile deviation, Standard deviation &Variance, Coefficient of Variation, Skewness and Kurtosis\

2. **Probability (6)**
   - Introduction
   - A Review of Sets
   - Random experiment, Sample space and Events (simple and composites), Mutuallyexclusive and Collectively exhaustive events, Independent events
   - Probabilities definition and Assignment
   - Finite Sample Space and Enumeration
   - Conditional probability
   - Partitions, Total probability, and Bayes' theorem and its applications
3. **One Dimensional Random Variables (3)**
   - Introduction
   - The Distribution Function
   - Discrete and Continuous Random variable

- Some Characteristics of Distributions (mean, variance)

4. **Functions of One Random Variable and Mathematical Expectation (3)**
   - Introduction
   - Equivalent Events
   - Function of Discrete and Continuous Random variable
   - Mathematical Expectation.

5. **Some Important Discrete Distributions (4)**
   - Introduction
   - Bernoulli Trials and the Bernoulli Distribution
   - The Binomial Distribution
        i. Mean and variance of Binomial Distribution
        ii. The cumulative Binomial Distribution
        iii. An application of Binomial Distribution
   - The Poisson Distribution
        i. Mean and variance of Poisson Distribution
        ii. The Poisson Approximation to Binomial Distribution

6. **The Normal Distribution (4)**
   - Introduction
   - Properties of the Normal Distribution
   - The Mean and Variance of the Normal Distribution
   - The Normal Cumulative Distribution
   - The Standard Normal Distribution
   - Problem-Solving Procedure
   - The Central Limit Theorem
   - The Normal Approximation to Binomial Distribution

7. **Random Samples and Sampling Distributions (4)**
   - Population and sample, Census and sampling, Estimate and estimator, Parameterand statistic
   - Random Samples
   - Statistics and Sampling Distributions
   - The Chi-Square Distribution
   - The t-Distribution
   - The F-Distribution

8. **Estimation (4)**
   - Point Estimation, Interval estimation
   - Properties of Estimators
   - Single-Sample Confidence Interval Estimation (mean and variance)
   - Two-Sample Confidence Interval Estimation (mean and variance)

9. **Tests of Hypotheses (4)**
   - Introduction
   - Tests of Hypotheses on a Single-Sample (mean and variance)

- Tests of Hypotheses on two Samples (mean and variance)

10. **Simple Linear Regression and Correlation (4)**
    - Simple Linear Regression and interpretation
    - Correlation and interpretation
    - Coefficient of determination

11. **Statistical Quality Control (4)**
    - Introduction, Statistical Process Control
    - Control Charts for Measurements
    - Control Charts for Individual Measurements
    - Control Charts for Attributes

Textbook:

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