Applied Statistics Course Curriculum

1.Foundation in Mathematics and Statistics-

A. Fundamentals of Mathematics-1…….....*3 days*

- Introduction to Sets
- Functions
- Progressions
- Techniques of Counting

B. Fundamentals of Mathematics-2……...*3 days*

- Limit and Continuity
- Differentiation
- Indefinite Integration
- Definite Integration

C. Matrices, Determinants and Collection of Data……....*3 days*

- Matrices and Determinants
- Applications of Matrices and Determinants
- Introduction to Statistics
- Collection and Scrutiny of Data

D. Presentation of Data……..……*3 days*

- Classification and Tabulation of Data
- Diagrammatic Presentation of Data
- Graphical Presentation of Data-I
- Graphical Presentation of Data-II

2.Descriptive Statistics-

A. Analysis of Quantitative Data……...*2 days*

- Measures of Central Tendency
- Measures of Dispersion
- Moments
- Skewness and Kurtosis

B. Correlation for Bivariate Data……..*2 days*

- Fitting of Curves
- Correlation Coefficient
- Rank Correlation
- Intra-Class Correlation

C. Regression and Multiple Correlation……..*2 days*

- Linear Regression
- Plane of Regression
- Multiple Correlation
- Partial Correlation

D. Theory of Attributes……..*2 days*

- Classification of Attributes
- Independence of Attributes
- Association of Attributes
- Association of Attributes for r × s Contingency Table

3.Probability Theory-

A. Basic Concepts in Probability……..…….*3 days*

- Introduction to Probability
- Different Approaches to Probability Theory
- Laws of Probability
- Bayes' Theorem

B. Random Variables and Expectation……..*3 days*

- Random Variables
- Bivariate Discrete Random Variables
- Bivariate Continuous Random Variables
- Mathematical Expectation

C. Discrete Probability Distributions……...…..*3 days*

- Binomial Distribution
- Poisson Distribution
- Discrete Uniform And Hypergeometric Distributions
- Geometric And Negative Binomial Distributions

D. Continuous Probability Distributions……*3 days*

- Normal Distribution
- Area Property of Normal Distribution
- Continuous Uniform And Exponential Distributions
- Gamma And Beta Distributions

4.Statistical Inference-

A. Sampling Distributions……...……..*3 days*

- Introduction to Sampling Distribution
- Sampling Distribution(s) of Statistic(s)
- Standard Sampling Distributions-I
- Standard Sampling Distributions-II

B. Estimation……..*3 days*

- Introduction to Estimation
- Point Estimation
- Interval Estimation for One Population
- Interval Estimation for Two Populations

C. Testing of Hypothesis……*4 days*

- Concepts of Testing of Hypothesis
- Large Sample Tests
- Small Sample Tests
- Chi-Square and F-Tests

D. Non-Parametric Tests……..…..*3 days*

- One-Sample Tests
- Two-Sample Tests
- k-Sample Tests
- Analysis of Frequencies

5.Statistical Techniques

A. Sampling Designs……....*2 days*

- Introduction to Sample Surveys
- Simple Random Sampling
- Stratified Random Sampling
- Some Other Sampling Schemes

B. Analysis of Variance……...……..*3 days*

- Introduction to Analysis of Variance
- One-way Analysis of Variance
- Two-way Analysis of Variance
- Two-way Analysis of Variance with m Observations per Cell

C. Design of Experiments……..……*2 days*

- Completely Randomised Design
- Randomised Block Design
- Latin Square Design
- Factorial Experiments

D. Random Number Generation and Simulation Techniques……*2 days*

- Random Number Generation for Discrete Variables
- Random Number Generation for Continuous Variables
- Simulation Techniques
- Applications of Simulation

6.Industrial Statistics-I

A. Process Control……...……..*4 days*

- Introduction to Statistical Quality Control
- Control Charts for Variables
- Control Charts for Attributes
- Control Charts for Defects

B. Product Control……..……*3 days*

- Acceptance Sampling Plans

- Rectifying Sampling Plans
- Single Sampling Plans
- Double Sampling Plans

C. Decision and Game Theory……*3 days*

- Introduction to Decision Theory
- Decision Making Process
- Two-Person Zero-Sum Games with Saddle Point
- Two-Person Zero-Sum Games without Saddle Point

D. Reliability Theory……...*2 days*

- Introduction to Reliability
- Reliability Evaluation of Simple Systems
- Reliability Evaluation of k-out-of-n and Standby Systems
- Reliability Evaluation of Complex Systems

7. Industrial Statistics-II

A. Optimisation Techniques-I……..*3 days*

- Introduction to Operations Research
- Linear Programming Problems
- Simplex Method
- Transportation Problem

B. Optimisation Techniques-II……..*2 days*

- Assignment Problems
- Queueing Theory
- Sequencing Problems
- Inventory Models

C. Regression Modelling……...*3 days*

- Simple Linear Regression
- Statistical Inference in Simple Linear Regression
- Multiple Linear Regression
- Selection of Variables and Testing Model Assumptions

D. Time Series Modelling……..*4 days*

- Trend Component Analysis
- Seasonal Component Analysis
- Stationary Processes
- Time Series Models

8. Practical Problems

Note- Videos will be uploaded along with the material. The course will start from 12-12-2020 and expected to finish by the end of February 2021.