

Nilkamal School of Mathematics, Applied Statistics & Analytics

M.Sc Statistics & Data Science

- Program Educational Objectives (PEOs)
- Program Outcomes (POs)
- Course Outcomes (COs)

Program Educational Objectives (PEOs):

- 1. Professional Skills :
- 2. <u>Career Growth</u>
- 3. <u>Higher Studies</u>

Program Outcomes (POs):

PO-1: Develop understanding of the major concepts and principles in Statistics & Data Science.

PO-2: Learn to process, visualise and analyse data in diverse domain specific areas using statistical methods.

PO-3: Be acquainted with statistical software and coding skills to match the needs of next generation statisticians.

PO-4: Be well versed with basic scientific research methodologies to engage in any problem solving situations.

PO-5: Think, nurture, translate and apply statistical knowledge to find solutions to real world problems.

PO-6: Inculcate ethical decision making while developing business strategies based on data analytics.

PO-7: Acquire ability to work efficiently and independently paving way for lifelong learning.

PO-8: Acquire, promote and inspire strong team bonding and fellowship and display distinct leadership traits.

PO-9: Develop effective oral communication and writing skills for clearly expressing interpretation of statistical analysis.

PO-10: Be industry ready and imbibe employability etiquettes and skills.

Courses and Course Outcomes (COs):

Linear Models & Design of Experiments

• **CO-1**: After completion of the course, students would be able to: Plan and conduct the experiment and analyse the data collected through the experiment

Real Analysis & Linear Algebra

• **CO-1**: After completion of the course, students would be able to: Use the mathematical concepts used in Statistics courses.

Probability Theory

• **CO-1**: After completion of the course, students would be able to: Apply probability concepts in Statistics courses

Distribution Theory

• **CO-1**: After completion of the course, students would be able to: Develop probability models for discrete and continuous data.

Estimation Theory

- **CO-1**: Implement the estimation techniques in data analysis problems and acquire expertise in frequentist estimation techniques for parameters of statistical models.
- **CO-2**: Conduct in-depth analysis of estimation problems and apply suitable estimation techniques that meet the constraints of the given data scenario and computational complexity.
- **CO-3**: Develop efficient estimators for estimating parameters and its properties.

Data Management

- **CO-1**: Apply data management techniques, such as factoring, pivoting, aggregating, merging, updates and dealing with missing values
- **CO-2**: SQL statements for defining and querying the database
- **CO-3**: Understand R and RStudio, exploring R packages, and apply functions, data structures, control flow, and loops using programming.

Research Treatise - I

- **CO-1**: Analyse the data by applying concepts and techniques learnt in various courses
- **CO-2**: Evince interest to read journal articles and pose research problems related to the courses studied.

Statistical Computing I

• **CO-1**: Understand applications of techniques learnt in theory papers

Introduction to Python Programming

• **CO-1**: After completion of the course, students would be able to: Analyse data using Python.

Applied Multivariate Analysis

- **CO-1**: Build a culture of design and approach in problem solving for decision making.
- **CO-2**: Develop analytical skills to collect, handle, manipulate and analyse results of multivariate analysis
- **CO-3**: Six-Step structured approach to formulation, estimation, and interpretation of multivariate models.

Regression Analysis

- **CO-1**: Formulate simple and multiple regression models
- **CO-2**: Carry out tests of linear hypothesis
- **CO-3**: Perform validation of a regression model
- **CO-4**: Select the important explanatory variables
- **CO-5**: Interpret the results in practical examples

Machine Learning Techniques

- **CO-1**: understand a wide variety of learning algorithms.
- **CO-2**: understand how to apply a variety of learning algorithms to data

• **CO-3**: understand how to perform evaluation of learning algorithms and model selection.

Testing of Hypothesis

• **CO-1**: Implement the testing procedures in data analysis problems

Advanced Python for Data Analysis

- **CO-1**: Master the fundamentals of writing Python scripts by learning core scripting elements such as variables, data structures and flow control structures
- **CO-2**: Work with lists and sequence data and write functions to facilitate code reuse.
- **CO-3**: Work with the Python standard library and explore file handling features.

Project Management

• **CO-1**: Carryout the project effectively, implementing the project management tools learnt in the course.

Research Treatise - II

- **CO-1**: Analyse the data by applying concepts and techniques learnt in various courses
- **CO-2**: Evince interest to read journal articles and pose research problems related to the courses studied.

Statistical Computing II

• **CO-1**: Understand applications of techniques learnt in theory papers

Reporting & Correspondence in Data Science

- **CO-1**: How to apply storytelling principles to analytics work
- **CO-2**: How to improve analytics presentations through storytelling
- **CO-3**: Follow guidelines and best practices for creating high-impact reports and presentations

Time Series Analysis

• **CO-1**: Analyse data using time series techniques and forecast

Stochastic Processes

• **CO-1**: Analyse stochastic processes using the techniques listed in the course.

Nonparametric Inference

• **CO-1**: Implement Nonparametric techniques for the data analysis.

Quality Management

• **CO-1**: Implement a set of quality management methods mainly empirical statistical methods to improve the process management of a project

Survival Analysis

• **CO-1**: To provide various statistical lifetime models, being used in medical sciences and industries.

Stochastic Finance

• **CO-1**: Apply Statistical methods to analyse stock market data

Pricing & Revenue Optimization

- **CO-1**: how companies should set and adjust their prices to maximize profitability
- **CO-2**: use of analytical techniques to determine prices in a complex and dynamic environment
- **CO-3**: ability to create pricing strategy by modelling the interplay of supply and demand

Deep Learning Techniques

- **CO-1**: Choose appropriate deep learning techniques in context of problem and interpret the results.
- **CO-2**: The results obtained should enable in reaching and formulating proper business strategies.
- **CO-3**: In general, they should reach a level of competence to use appropriate techniques and software like Python and /or R and interpret the output.

Introduction to Big Data Technologies & its Applications

- **CO-1**: Develop an appreciation for what is involved in learning from big data.
- **CO-2**: Understand business motivation, application, technology and big data architecture.
- **CO-3**: Understand how to apply and use a variety of ecosystem available for big data.
- **CO-4**: Understand how to build systems and evaluate algorithms for big data application

Statistical Computing III

• **CO-1**: Understand applications of techniques learnt in theory papers

Organizational Behaviour

- **CO-1**: Awareness about basics of leadership in organizations
- **CO-2**: Understanding of basic leadership behavioural skills in organization life
- **CO-3**: Application through assignments and/or class room participation (of key skills to improve the students' skills of operating in a group)

Research Treatise - III

- **CO-1**: Analyse the data by applying concepts and techniques learnt in various courses
- **CO-2**: Evince interest to read journal articles and pose research problems related to the courses studied.

Cloud Computing

Industry Internship

- **CO-1**: Understand and imbibe the work culture in an Industrial environment such as but not limited to beliefs, thought processes, attitudes of the employees, ideologies and principles of the organization, team building and leadership, problem formulation and solution
- **CO-2**: Foster critical thinking and analytical skills through hands-on learning
- **CO-3**: Define academic career and personal interests

• **CO-4**: Expand knowledge and understanding of a chosen field outside of the classroom

Trends in Data Science

• **CO-1**: Analyse the real world business problems using the techniques learnt in the course