SVKM'S
NMIMS
Deemed to be UNIVERSITY

Nilkamal School of Mathematics, Applied Statistics & Analytics

M.Sc (Applied Statistics & Analytics)

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

Program Educational Objectives (PEOs):

1. **Professional Skills**
2. **Career Growth**
3. **Higher Studies**

Program Outcomes (POs):

PO-1: On completion of this program, a student would build a strong foundation for theoretical and conceptual understanding of Applied Statistics as well as Analytics domain.

PO-2: On completion of this program, a student would build a strong foundation for theoretical and conceptual understanding of Applied Statistics as well as Analytics domain.

PO-3: Students will be able to handle big data, clean and process it.

PO-4: They will be able to use appropriate models for analysis, derive business insights from the results.

PO-5: They will be able to apply computing theory in different software and languages.

PO-6: They will be able to perform well in group and develop professional presentation skills.

PO-7: They will develop leadership skills and in still a sense of ethical decision making.

Courses and Course Outcomes (COs):

Probability Models for Data Analytics

- **CO-1**: To be able to quantify uncertainty about events using mathematical descriptions of probability models.
- **CO-2**: To be able to identify appropriate probability models for experiments/data involving univariate and multivariate random variables.
- **CO-3**: Should be able to understand and use different probability models.

Modern Statistical Inference

- **CO-1**: Gain knowledge of theory of modern statistical inference.
- **CO-2**: Develop ability to apply the results of modern statistical inference, develop theoretical as well as algorithmic understanding
- **CO-3**: Students can apply Bayesian computation and re-sampling methods.
- **CO-4**: Gain knowledge of multiple testing procedure and ability to apply them for real problems.

Design of Experiments

- **CO-1**: Students will be able to understand planning and conducting the experiment and analysing the data collected through the experiment.

Stochastic Models for Analytics

- **CO-1**: State the defining properties of various stochastic process models and identify appropriate stochastic process model(s) for a given applied problem in analytics.
- **CO-2**: Apply Markov chains in discrete- and continuous-time to solve inventory and queueing problems.
- **CO-3**: Apply the theory to model real phenomena and answer some questions in applied sciences and analytics.

General Management

- **CO-1**: Awareness about principles of management.
- **CO-2**: Understanding of entrepreneurship and managing people.
- **CO-3**: Overview of how organizations work.

Statistical Computing I

- **CO-1**: Simulate data from various univariate and bivariate distributions and study their properties empirically.
- **CO-2**: Compare resampling methods and iterative algorithms for estimation of parameters of an underlying distribution.
- **CO-3**: Apply various designs studied in theory to real life data sets coming from pharmaceutical, clinical or manufacturing industries.
- **CO-4**: Understand the use of different stochastic processes to model insurance and stock market data.

Statistical Computing II

- **CO-1**: Ability to handle data related problem using Base SAS Software along with SQL.
- **CO-2**: Ability to read, write and manipulate the data.
- **CO-3**: Ability to run standard procedures of SAS necessary for data preparation.

Programming for Analytics

- **CO-1**: Write efficient and readable R program.
- **CO-2**: Develop R program involving decision structure, loops, arrays and functions.
- **CO-3**: Create a R program for any given statistical problem

Data Driven Analytics I

- **CO-1**: Define business problem and the corresponding relevant research problem.
- **CO-2**: Choose appropriate data analysis technique.
- **CO-3**: Perform the analysis to fulfill the objective and interpret the results to the users.

Generalized Linear Models

- **CO-1**: carry out multiple linear regression analysis.
- **CO-2**: apply shrinkage (regularized) methods for the estimation and variable selection.
- **CO-3**: give an account of the idea of generalizing of linear modelling.
- **CO-4**: find the right link function, such as logit, probit etc.
- **CO-5**: apply inference to general linear models.
- **CO-6**: interpret the results in practical examples.

Financial Time Series Analysis

- **CO-1**: Estimate using linear time series and volatility models.
- **CO-2**: Forecast financial data using high-level econometric techniques and measure their effectiveness.
- **CO-3**: Use CAPM models and connect individual returns to market return.
- **CO-4**: Do portfolio analysis, high frequency data analysis from financial markets.

Applied Multivariate Data Analysis

- **CO-1**: To choose appropriate model for a given data set
- **CO-2**: To apply appropriate multivariate statistical techniques to business problems.

Survival Analysis

- **CO-1**: Understand the basic theoretic and applied principles of survival analysis.
- **CO-2**: Analyze survival data using appropriate statistical software.
- **CO-3**: Check underlying survival model assumptions.
- **CO-4**: Generate diagnostic plots and graphs.
- **CO-5:** Compute sample size and power for survival models.
- **CO-6:** Use frailty models effectively to model survival time.

Introduction to 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)

Statistical Computing III

- **CO-1**: Apply various regression techniques to analyze different data sets.
- **CO-2**: Dimension reduction by using multivariate techniques.
- **CO-3**: Applications of survival analysis to model lifetime data, financial data etc.
- **CO-4**: Understand the use of different univariate and multivariate time series models to model insurance, stock market data and forecasting.

Statistical Computing IV

- **CO-1**: handle a statistical analysis situation from the software perspective.
- **CO-2**: read, write and manipulate the data.
- **CO-3**: run statistical analysis.

Data Visualization & Management for Analytics

- **CO-1**: Create an interactive and sharable dashboard.

Data Driven Analytics II

- **CO-1**: Define business problem and the corresponding relevant research problem.
- **CO-2**: Choose appropriate data analysis technique.
- **CO-3**: Perform the analysis to fulfill the objective and interpret the results to the users.

Introduction to Machine Learning Techniques

- **CO-1**: understand advantage of machine learning techniques over traditional predictive modelling.

High Performance Data Mining

- **CO-1**: Be able to be well conversant with high performance data mining approach that is mostly applicable in Data Science / Big Data industry.

Statistical Computing V

- **CO-1**: Be able to apply various machine learning techniques to solve real life problems faced by various industries/ sectors.

Statistical Computing VI (Hadoop)

- **CO-1**: select tools and put architecture in place for solving specific Big Data processing problems

Project Management

- **CO-1**: To understand project management design, development, and deployment
- **CO-2**: To learn to align critical resources for effective project implementation
- **CO-3**: To understand the implications, challenges, and opportunities of organizational dynamics in project management.

Analytics Application Development

- **CO-1**: To apply a solution clearly and accurately in a program using python.
- **CO-2**: To analyse and visualize the data using python libraries.

Data Driven Analytics III

- **CO-1**: Define business problem and the corresponding relevant research problem.
- **CO-2**: Choose appropriate data analysis technique.
- **CO-3**: Perform the analysis to fulfill the objective and interpret the results to the users.

Marketing Analytics

- **CO-1**: handle a marketing problem with data insights and provide effective course of analysis.
- **CO-2**: perform descriptive analysis, segmentation, survival analysis, customer life time value calculations, RFM analysis sentiment analysis and social network analysis.

Financial Analytics

- **CO-1**: analyse economic and financial data using statistical models.
- **CO-2**: fit appropriate model and interpret.