

Nilkamal School of Mathematics, Applied Statistics & Analytics

B.Sc (Applied Statistics & Analytics)

- 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: To expose students to the upcoming era of Machine Learning & Data Science

PO-2: The programme aims at providing a rigorous training in fundamental concepts of Statistics, Mathematics, Economics & Computers which creates a strong knowledge base in Data Science domain.

PO-3: To provide a complete understanding of the subject by introducing projects from the third semester on the relevant statistical subject.

PO-4: Introduce two core business areas i.e. Marketing Analytics and Financial Risk Analytics to give a deeper insight of the business domain at the undergraduate level

<u>PO-5</u>: Introduce two core business areas i.e. Marketing Analytics and Financial Risk Analytics to give a deeper insight of the business domain at the undergraduate level

PO-6: Focus on the overall development of the students to help gain knowledge and skillsets required for further studies as well as for an edge in employability after completion of the course.

Courses and Course Outcomes (COs):

Descriptive Statistics - I (Theory)

• **CO-1**: student should be able to prepare the data and select appropriate methods to represent data graphically and derive the basic descriptive statistics of the data.

Descriptive Statistics - I (Practical)

• **CO-1**: student should be able to prepare the data and select appropriate methods to represent data graphically and derive the basic descriptive statistics of the real life data.

Introduction to Probability Theory

• **CO-1**: Students will be able to understand basic elements of probability theory and apply them to solve real life problems.

Discrete Mathematics

• **CO-1**: Student should be able to study or describe objects or problems in computer algorithms and programming languages.

Calculus and Differential Equations

• **CO-1**: Students will have understanding of mathematical calculus through visualizations. will have strong foundations for theory of probability and statistics

Functional Programming (Theory)

• **CO-1**: After completion of the course, students would be able to implement basic programs of python

Functional Programming (Practical)

• **CO-1**: After completion of the course, students would be able to have hands on practice and implementation of basic programs of python

Micro Economics

- **CO-1**: Student should be able to describe, compare and correlate the important Economic
- **CO-2**: phenomena of production, consumption, exchange and distribution with the help of Statistics.

Effective Communication

- **CO-1**: Awareness about self and community
- **CO-2**: Understanding different ways of communication

Descriptive Statistics - II (Theory)

- **CO-1**: Understand the concepts of Vital Statistics, Index Numbers
- **CO-2**: Applying them in policy making

Descriptive Statistics - II (Practical)

- **CO-1**: Apply the concepts of Vital Statistics, Index Numbers
- **CO-2**: Solving the practicals using Excel and R

Discrete Probability Distributions

• **CO-1**: The course will enable the students to describe the data with the help of specific distributions and understand its behaviour

Continuous Probability Distributions

• **CO-1**: The course will enable the students to describe the data with the help of specific distributions and understand its behaviour

Linear Algebra

- **CO-1**: Understanding of the various fundamental concepts of Linear algebra
- **CO-2**: Understanding its wide applications in Statistics and Analytics
- **CO-3**: Solving theoretical and application based problems

Numerical Methods (Theory)

- **CO-1**: To solve transcendental equations, polynomial approximations and integrations by different techniques
- **CO-2**: Solving the problems by writing the programs on the relevant software

Numerical Methods (Practical)

• **CO-1**: Solving the problems by writing the programs on the relevant software using real life data

Python Programming

• **CO-1**: After completion of the course, students would be able to process the data and plot different charts

Environmental Studies

- **CO-1**: Understanding of the working of ecosystem
- **CO-2**: Exploring the impacts of natural, manmade and legislative events on the natural world and its inhabitants

Sampling Theory

- **CO-1**: Students will understand theory of various Sampling Techniques used in real life situations.
- **CO-2**: To able to apply various sampling techniques while conducting sample survey in many instances

Sampling Distributions & Applications (Theory)

- **CO-1**: Understand various sampling distributions and their applications
- **CO-2**: Solve real life problems in practical.

Sampling Distributions & Applications (Practical)

- **CO-1**: Understand various sampling distributions and their applications
- **CO-2**: Solve real life problems in practical.

Estimation Theory

- **CO-1**: To develop estimators for population characteristics using different Estimation Techniques.
- **CO-2**: Study the properties of the developed estimators in sample

Operations Research - I (Theory)

- **CO-1**: Understanding of various optimization techniques.
- **CO-2**: Solving problems based on the industrial decision making process by using relevant software

Operations Research - I (Practical)

• **CO-1**: Solving problems based on the industrial decision making process by using relevant software and implementing on data.

Multivariate Calculus

• **CO-1**: Understanding of the mathematical concepts of limit, continuity in higher dimensions with emphasis on applications.

Introduction to R

• **CO-1**: After completion of the course, students would be able to understand and write functions in R. Perform basic data analysis in R.

Financial Economics

• **CO-1**: Student should be understand the microeconomic theory relevant to financial transactions

Research Methods

- **CO-1**: Student should have an overview of the important concepts of research intent and design.
- **CO-2**: They should be able to understand the process of data collection, statistical and interpretive analysis, and final report presentation.

Hypothesis Testing

- **CO-1**: Students will understand concepts of Statistical hypothesis, developing tests to test the Hypothesis
- **CO-2**: Formulation of Statistical hypothesis is real life situations. Apply appropriate test to validate the hypothesis

Designs of Experiments (Theory)

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

Designs of Experiments (Practicals)

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

Stochastic Processes

- **CO-1**: Students get introduction to the different stochastic/random processes, theoretical foundations for Stochastic Processes
- **CO-2**: Applications of Stochastic processes in queuing theory, applied sciences, etc

Actuarial Science

- **CO-1**: Understand the fundamental concepts of the Life tables, Life insurance, Annuities
- **CO-2**: Apply the learned techniques on real life situations.

Data Management (Theory)

- **CO-1**: Students will be able to design and draw ER and EER diagram for the real life problem.
- **CO-2**: Students will be equipped to create database through Relational Database concepts and retrieving the data. The SQL queries are implemented using Oracle.

Data Management (Practical)

• **CO-1**: Students will be equipped to create database through Relational Database concepts and retrieving the data. The SQL queries are implemented using Oracle.

Applied Economics

• **CO-1**: After completion of the course student should be able to integrate the theory, data and judgment in the analysis of corporate decisions and public policy.

Research Writing

• **CO-1**: Getting a basic understanding essentials of formulating, conducting, and delivering a robust research project

Time Series & Forecasting (Theory)

- **CO-1**: To gain insights about the forecasting techniques
- **CO-2:** To understand the regression framework and the basic assumptions of ordinary least squares
- **CO-3:** To estimate, interpret and validate multiple regression models.
- **CO-4:** To understand Time Series decomposition and its components
- **CO-5:** To forecast time series data with the appropriate forecasting model

Time Series & Forecasting (Practical)

- **CO-1**: Perform Regression analysis on the given dataset using appropriate software.
- **CO-2:** Check and validate all the assumptions of regression analysis.
- **CO-3:** Decompose a time series and estimate its component.
- **CO-4:** Fit an appropriate forecasting model on the given data.

Operations Research - II (Theory)

- **CO-1**: To introduce to the optimization techniques used in industrial resource management.
- **CO-2:** Solve real life optimization problems by using relevant software

Operations Research - II (Practical)

• **CO-1**: optimize the problems by using relevant Software

Statistics in Life Science

• **CO-1**: Basic understanding of the key concepts of marketing, use of internal and external data/ information needed for marketing decisions

Fundamentals of Financial Risk

- **CO-1**: Understand and evaluate complex dimensions of the financial risks
- **CO-2:** Quantify risks
- **CO-3:** Map statistical concepts and techniques to finance for risk assessment, mitigation and monitoring
- **CO-4:** Develop basic financial risks models

Visual Analytics

- **CO-1**: interact with the environment via the Visual Analytics Hub
- **CO-2:** access and prepare data for exploration, analysis, and reporting
- **CO-3:** explore data using the Visual Analytics Explorer
- **CO-4:** create reports with the Visual Analytics Designer
- **CO-5:** use the Visual Data Builder and understand the capabilities of the Visual Analytics Administrator
- **CO-6:** View reports using the Visual Analytics Viewer and Mobile BI App.

Employability Skills

• **CO-1**: Identify and use appropriate words for communication, choose proper tools to communicate, use positive body language while communicating, maintain proper eye contact to build trust and confidence.

Introduction to Data Science

• **CO-1**: Basic understanding of the key concepts, algorithms and models relevant to data science, understand the data patterns to be mined, data mining algorithms, and machine learning techniques.

Quality Management (Theory)

• **CO-1**: Students should be able to use a set of quality management methods, mainly empirical, statistical methods to improve the process management of a project.

Quality Management (Practical)

• **CO-1**: Students will be able to a set of quality management methods, mainly empirical, statistical methods to improve the process management of a project.

Statistical Modelling in Marketing Analytics

• **CO-1**: Analyze and critically interpret data, build statistical models of real situations in marketing.

Statistical Modelling in Financial Risk

- **CO-1:** Understand and evaluate complex dimensions of the financial risks
- **CO-2:** Develop basic financial risk models using statistical techniques

Data Science using R

- **CO-1:** Learn tools and techniques for Statistical analysis and Data transformation
- **CO-2:** Understand Data Mining techniques and their implementation
- **CO-3**: Analyze Data using Machine Learning algorithms in R

Business Ethics

• **CO-1:** Students would be having a better understanding of how businesses devise their strategy to positively engage all their stakeholders including environment, employees, and community at large.