



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited A++ Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

School of Science and Humanities

Department of Mathematics

1.2.1 New Courses introduced and having focus on Employability / Entrepreneurship / Skill Development

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SMTA3516	EXPLORATORY DATA ANALYSIS AND TIME SERIES	L	T	P	Credit	Total Marks
		4	1	0	4	100

COURSE OBJECTIVES

- To understand the basic statistical tools for analysis & interpretation of qualitative & quantitative data.
- To introduce basic concepts of Statistics and to provide Statistical techniques for data analysis.
- To understand various components of time series.

UNIT I: INTRODUCTION TO DATA ANALYSIS

9 Hrs

Introduction – collection, classification and tabulation of data – Concept of primary and secondary data –Data - quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio –Data visualization - Bar diagram, pie chart, histogram, frequency curve and frequency polygon – Ogives

Unit II: DESCRIPTIVE STATISTICS

9 Hrs

Data summarization – Mean, Median and Mode – Measures of dispersion – Range, Quartile deviation and standard deviation – coefficient of variation – skewness and kurtosis

UNIT III: BIVARIATE DATA

9 Hrs

Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves

UNIT IV: INTRODUCTION TO TIME SERIES

9 Hrs

Introduction to times series data - application of time series in various fields - Components of a times series, Decomposition of time series - Trend - types of Trends

UNIT V: ANALYSIS OF TIME SERIES

9 Hrs

Measure of trend – Graphical method, Semi Average method, Moving Average method and Least Square method – Measurement of Seasonal Variation – Simple Average method, Ratio Trend method and Ratio Moving Average method

Course Outcomes:

- CO1: Identify, classify and tabulate the data. Construct various frequency charts.
- CO2: Evaluate the various measures of central tendency and measures of variation.
- CO3: Evaluate the Karl Pearson's correlation coefficient, Spearman's correlation coefficient and Regression Equations. Explore the relationship between correlation and regression. Fitting of straight line by least squares.
- CO4: Empathize the students about the importance of Time series and components of Time series.
- CO5: Explain the various methods to measure the trend
- CO6: Explore the methods designed to measure the seasonal variation.

SMTA3517	TIME SERIES ANALYSIS	L	T	P	Credits	Total Marks
		3	*	0	3	100

COURSE OBJECTIVES

- Understand the basic concepts in time series analysis
- Attain knowledge of time series regression
- Gain knowledge of frequently used time series models
- Understanding the problems arising when analyzing stationary processes
- Gain knowledge of ARIMA modeling of stationary time series

UNIT I: INTRODUCTION TO DATA ANALYSIS

9 Hrs

Introduction – collection, classification and tabulation of data – Concept of primary and secondary data –Data - quantitative and qualitative, attributes, variables, scales of measurement - nominal, ordinal, interval and ratio –Data visualization - Bar diagram, Pie chart, histogram, frequency curve and frequency polygon –Ogives

UNIT II: INTRODUCTION TO TIME SERIES

9 Hrs

Introduction to Time series – Applications of Time Series in various fields-Components of a time series- Decomposition of time series - Trend - Measure of trend collection –Types of Trends .

UNIT III: ANALYSIS OF TIME SERIES

9 Hrs

Methods in Time Series– Graphical method, Semi Average method, Moving Average method and Least Square method – Measurement of Seasonal Variation – Simple Average method, Ratio to Trend method and Ratio to Moving Average method.

Unit VI: Bivariate data

9Hrs

Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), principle of least squares and fitting of polynomials and exponential curves - Introduction to Linear regression – Multiple regression.

Unit V: Auto Regressive Integrated Moving Average (ARIMA) Model

9 Hrs

Meaning of Stationary process – Auto Regressive models, Moving Averages models, ARMA models, ARIMA models –Error measures in forecasting. (Unit V is only theory)

COURSE OUTCOMES

On completion of the course the student will be able to

- CO1: Apply the knowledge on real world time series and forecast problems
- CO2: Think critically and analyse problems
- CO3: Information and technology literacy
- CO4: Choose and apply the right smoothing method for the data.
- CO5: Apply of knowledge, skills, and responsibilities to new settings and progressively more complex problems
- CO6: Critically review and evaluate time series models and choose the best modeling approach

SMTA3515	APPLIED STATISTICS	L	T	P	Credit	Total Marks
		4	1	0	4	100

COURSE OBJECTIVES

To understand the basic statistical tools for analysis & interpretation of qualitative & quantitative data.

To introduce basic concepts of Statistics and to provide Statistical techniques for business data analysis.

To understand various components of time series.

UNIT I: INTRODUCTION TO STATISTICS

10 Hrs.

Origin and development of statistics – Definition of statistics-Importance and Scope of Statistics – Limitations of statistics – Misuse of statistics. Presentation of Data- Diagrammatic representation of data – Bar diagrams – Pie diagrams – histogram- Frequency Polygon and frequency curve – Pictogram and Cartogram.

UNIT II: MEASURES OF CENTRAL TENDENCY

10 Hrs.

Simple averages – mean, median, mode – Geometric mean and Harmonic mean – Weighted Arithmetic mean – Measures of Dispersion- Range – Quartile deviation – Mean deviation – Standard deviation –Coefficient of variation – Combined mean and standard deviation. Skewness- Karl Pearson and Bowley's Coefficient of Skewness- Moments- Kurtosis.

UNIT III: CURVE FITTING

10 Hrs.

Fitting a straight line and second degree parabola. Correlation- Scatter diagram – Limits of correlation coefficient – Spearman's Rank correlation coefficient- Simple problems – Regression- Properties of Regression coefficients and regression lines.

UNIT IV: TIMES SERIES

10 Hrs.

Components of time series – additive and multiplicative models – Measurement of Trend- Graphical Method – Semi average method – Moving average method – least square method- Measurement of seasonal variation – Method of simple average method – Ratio trend method- Ratio to Moving average method- Method of link relatives.

UNIT V: INDEX NUMBERS

10 Hrs.

Construction of index numbers – Unweighted index numbers- Weighted index numbers- Laspeyr's method – Paasche's method – Drobish and Bowley method – Marshall – Edge worth method- Fishers method – Kelly's method – quality index numbers– Chain index numbers – Base shifting – Splicing and deflating the index numbers – consumer Price index numbers.

COURSE OUTCOMES:

On the completion of the course the student will be able to

CO1: This course enhances the students to understand the concept of statistics and development of statistics.

CO2: It helps the students to gain knowledge about the tendency and measures of central tendency.

CO3: It makes the students to understand the concept of Curve fitting.

CO4: It empathises the students about the importance of time Series and methods of Time series.

CO5: Enhance the Students about the index number and types of index numbers.

CO6: This Course will equip the students with the required Professional Skills.



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**SCHOOL OF SCIENCE AND HUMANITIES
DEPARTMENT OF MATHEMATICS
MINUTES OF BOARD OF STUDIES MEETING**

DATE: 12/05/2022

TIME: 10 a.m. – 12 noon

Venue: Department of Mathematics

The department head Dr. M. Nirmala, greeted the external members. The following list of electives has been included to the B.Sc Mathematics curriculum after discussion with BOS members in order to enhance the advanced mathematical approaches.

SMTA3515 – APPLIED STATISTICS

SMTA3516 - EXPLORATORY DATA ANALYSIS AND TIME SERIES

- The members agreed that a significant adjustment to the B.E. and B.Tech. syllabus is not necessary for the odd semester of the 2022–2023 academic year.
- The members acquiesced that a significant adjustment to the M.Sc. syllabus is not necessary for the odd semester of the 2022–2023 academic year.
- The Board of Studies met on May 12, 2022, at 10 a.m. All of the suggestions brought up throughout the meeting were recorded.
- Dr. M. Nirmala gave a vote of thanks to conclude the meeting.
- The above-mentioned revision was done in order to satisfy the demands for enhancing technical skill knowledge and modern, updated learning approaches.

EXTERNAL MEMBERS

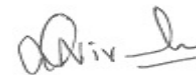
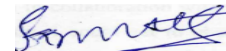
1. **Dr. V. Kumaran, Professor, Department of Mathematics, NIT, Trichy.**
2. **Dr. Krishnamoorthy Somanchi, Professor and Head, Department of Applied Mathematics, Defence Institute of Advanced Technology, Giri Nagar, Pune**

INTERNAL MEMBERS

1. Dr. M. Nirmala, Professor and Head, Department of Mathematics, Sathyabama Institute of Science and Technology, Chennai.
2. Dr. R. Parameswari, Associate Professor, Department of Mathematics, Sathyabama Institute of Science and Technology, Chennai.
3. Dr. C. Kavitha, Associate Professor, Department of Mathematics, Sathyabama Institute of Science and Technology, Chennai.

SIGNATURE OF THE MEMBERS

1. Dr. V. KUMARAN
Department of Mathematics,
NIT, Trichy
2. Dr. KRISHNAMURTHY SOMANCHI
Professor and Head,
Department of Applied Mathematics,
Defence Institute of Advanced Technology,
Giri Nagar, Pune
3. Dr. M. NIRMALA
Professor & Head
Department of Mathematics,
Sathyabama Institute of Science and Technology, Chennai
4. Dr. R. PARAMESWARI
Associate Professor
Department of Mathematics,
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SCHOOL OF SCIENCE AND HUMANITIES
DEPARTMENT OF MATHEMATICS
MINUTES OF BOARD OF STUDIES MEETING

DATE: 14/12/2022

TIME: 10 a.m. – 12 noon

Venue: Department of Mathematics

Dr. M. Nirmala, the department head, welcomed the members. After consulting with BOS members, the following list of elective has been added to the B. Sc. Mathematics curriculum in order to strengthen the sophisticated mathematical techniques.

SMTA3517 - TIME SERIES ANALYSIS.

- The members had a brainstorming discussion and interaction among themselves. After discussion, fruitful suggestions were given by the external members.
- The members concluded that for the even semester of the 2022–2023 academic year, no significant changes to the B.E. B.Tech. syllabus are required.
- Dr. V. Kumaran suggested that PG students has to be encouraged to register the courses from the open online forum (like Udemy, Coursera etc.,) with the approval of Head of the department for their future research interests.
- The suggested Reference Books are taken into account for UG and PG students.
- The members concurred that for the even semester of the 2022–2023 academic year, no significant changes to the M.Sc. course are required.
- On Dec 14, 2022, at 10 a.m., the Board of Studies convened. There was a record of every recommendation made during the discussion.
- In order to conclude the meeting, Dr. M. Nirmala offered a vote of gratitude.
- The above-mentioned revision was done in order to satisfy the demands for enhancing technical skill knowledge and modern, updated learning approaches.

EXTERNAL MEMBERS

1. Dr. V. Kumaran, Professor, Department of Mathematics, NIT, Trichy.
2. Dr. Krishnamoorthy Somanchi, Professor and Head, Department of Applied Mathematics, Defence Institute of Advanced Technology, Giri Nagar, Pune.

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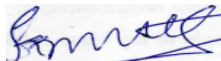
SIGNATURE OF THE MEMBERS

Dr. V. KUMARAN



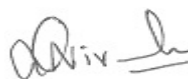
Department of Mathematics,
NIT, Trichy

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Professor and Head,
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