UNIVERSITY OF MYSORE

DEPARTMENT OF STUDIES IN ECONOMICS AND CO-OPERATION
MANASAGANGOTRI, MYSURU-570 006
Diploma/Certificate Course in Economics

[Syllabus: 2017-2018]

INSTRUCTIONS:

1. **Duration** : Certificate Course is for duration of 3 Months/1 Month/Two Weeks.
2. **Number of Credits** : Number of Credits for Each Certificate Course shall be FIVE.
3. **Teaching Hours** : 5 Hours per Week x 12 Weeks = about 60 Hours for Each Course.

-OR- : Intensive Certificate Course for One Month.

3 Hours per Day x 5 Days = 15 Hours per Week x 4 Weeks = 60 Hours.

-OR- : Intensive Certificate Course for Two Weeks.

5 Hours per Day x 6 Days = 30 Hours per Week x 2 Weeks = 60 Hours

: [This shall be inclusive of Theory/Application/Practical-work and seminars as required/applicable to each course depending on the content/approach by faculty]

4. **Scheme:** : Fully Self Finance Programme [i.e.,Scheme-B]
5. **Fees Structure** : Rs. 4000/- [Per Certificate Course]
6. **Intake** : Minimum 30 & Maximum 60
7. **Allocation of Marks: Number of Marks for Each Course: 100**

Out of 100 Marks: **C3** = 70 Marks is for Theory Examination [Comprehensive end Semester Exam]

C1+ C2 = 15 + 15 = 30 Marks is for Continuous Assessment [for each Cours]

30 Marks for C1 & C2 shall have the break-up as follows:

C1 : 10 Marks for the First Test + 5 Marks for Assignment [for each course]
C2 : 10 Marks for the Second Test + 5 Marks for Seminar [for each course]

Note: Minimum of 30% in C1+C2 put together is required for a candidate to qualify for taking up C3 Examination.

8. **General Eligibility Criteria:**

- Students who have completed their Bachelor‟s Degree with Economics as one of the Cognate Subjects, B.Sc., with Mathematics or Statistics as one of the Cognate Subjects in Bachelor‟s Programme, B.Com, BBM and Students with Masters‟ Degree in Social Science, Commerce & Management are eligible to purse this Course.

CERTIFICATE COURSE IN APPLIED ECONOMETRICS FOR RESEARCH

Programme outcomes

This certificate course has been designed with the objective to develop in-depth knowledge of students in statistical foundations of econometric theory as well as econometric methods and applications in empirical research.

Programme specific outcomes

Provide knowledge of a wide range of econometric techniques using excel or other statistical software.

Course outcomes

On successful completion of the course, a student will be able to apply econometric techniques in economic research.

Pedagogy

The topics will be covered by lecture sessions along with hands on practical training using databases and computer software STATA and EVIEWS. The datasets (mostly economic theory based) provide students with examples to help apply the techniques studied in class to real business world problems.

Module-1: Qualitative Dependent Variable Models

Nature of Qualitative Variables - Linear Probability Model - Logit Model - Probit Model - Tobit Model for Grouped and Ungrouped Data - Their Application in Economics.

Module-2: Time Series Econometrics

Introduction - Stationary and Non-Stationary Series - Random Walk Model - Testing of Unit Root - Co-integration - Test for Co-integration - Engel-Granger Test - Johansen Test - Error Correction Model - Introduction to ARCH and GARCH Modeling - Their Application in Economics.

Module-3: Panel Data Models

Why Panel Data? - Estimation - Fixed Effects Method - All Coefficient Constant across Time and Individuals - Slope Coefficients Constant but Intercept Varies across Individuals - Slope Coefficients Constant but Intercept Varies Over Individuals as Well as Time - All Coefficients Vary across Individuals - Random Effects Method - Fixed Effects v/s Random Effects Model - Hausman Test - Their Application in Economics.

Module-4: Empirical Demand, Production and Investment Analysis

Static Single Equations - Demand Analysis - Theoretical Foundations of Demand Analysis - Utility Theory - Tobin‟s Study- Static Multiple Equations - Production Function - Neoclassical Production Function - Cobb-Douglas Production Function - CES Production Function - Dynamic Single Equation Model - Investment Behaviour Models - Meyer and Kuh Model - Kuh Model

Module-5: Econometric Applications in India

Econometric Applications in Indian Demand Analysis - Indian Agriculture - Indian Industry - International Trade.

References: [Please refer to the Latest Editions]

1. Brooks Chris, *Introductory Econometrics for Finance*, Cambridge University Press, Cambridge.
2. Desai Meghnad, *Applied Econometrics*, McGraw Hill Publishing Company Ltd.
3. Gujarathi Damodar, *Basic Econometrics*, McGraw Hill, International Student Edition.
4. Krishna K. L., *Indian Econometrics Models*, Oxford University Press, Oxford.
5. Patterson Kerry, *An Introduction to Applied Econometrics a Time Series Approach*, Macmillan Press.

CERTIFICATE COURSE IN BASIC MATHEMATICS FOR RESEARCH

Programme outcomes

This certificate course has been designed with the purpose to develop the knowledge of students with various applications of mathematical tools and techniques in defining, developing and measuring economic relationships.

Programme specific outcomes

Provide knowledge of a wide range of mathematical tools and their applications in consumer and firm's behavior, production and cost analysis.

Course outcomes

On successful completion of the course, a student will be able to quantify relationship among economic variables.

Pedagogy

The topics will be covered by lecture sessions along with seminars and group discussions.

Module-1: Basic Mathematics for Economic Analysis

Relationship between Mathematics and Economics - Applications of Mathematics in Economic Analysis - Its Uses and Limitations - Logic, Sets and Relations - Functions -Meaning and Types: Linear and Non-Linear, Power, Exponential and Logarithm - Analytical Geometry - Simultaneous Equations - Solutions for Two Variables Application to Market Equilibrium: Derivation of Demand and Supply Functions - Marshal and Walras‟ Stability Conditions - Effect of Taxes and Subsidies, Indifference Curves, National Income, Interest: Compounding and Discounting, Changes in Aggregate Demand and Supply Functions, Consumption Function.

Module-2: Elementary Matrix Algebra

Basic Concepts - Types of Matrix - Matrix Operations - Transpose - Inverse Matrix -Determinants: Meaning, Properties, Rank of Matrix, Minor, Co-factor.
Functions of Several Variables - Cramer‟s Rule and its Applications in Economics.

Module-3: Differential and Integral Calculus

Differential Calculus**:** Limits - Derivations - Rules of Differentiation - Partial Derivatives, Total Derivatives, - Maxima and Minima for One and Two Variables.

Applications to Economic Analysis:
Consumers Behavior: Elasticity of Demand, Relationship between Price Elasticity and TR, AR and MR, Consumers‟ Equilibrium and Utility Maximization

Firm's Behaviour: Production Function - Cost Function - Revenue Function - Equilibrium of Firm and its Profit Maximization - Homogenous Function - Cobb-Douglas Production Function - CES Production Function - Euler‟s Theorem - Monopoly and Joint Production -Duopoly, Monopolistic Competition and Oligopoly.
Integral Calculus: Techniques of Integration - Definite and Indefinite Integration.

Applications to Economic Analysis: Consumer‟s Surplus - Producer‟s Surplus.

Introduction to Frontier Analysis: Technical Efficiency - Technological Change and Total Productivity - Multi-Market Equilibrium.

Module-4: Difference and Differential Equations

Difference Equations: Definitions and Concepts - Solutions to First Order and Second Order Difference Equations.
Applications to Economics: Cob-web Model.

Differential Equations: Definitions and Concepts - Solutions to First Order and Second Order Differential Equations.
Applications to Economics: Harrod-Domar Model, Multiplier and Accelerator.

Module-5: Linear Programming and Input-Output Analysis

Linear Programming: Basic Concepts - Constrained Optimization - Formulation of Linear Programming Problem - Nature of Feasible and Optimal Solutions - Solution through Graphical Methods - Introduction to Simplex method - Duality Theorem.
Input-Output Analysis: Basic Concepts, Static, Open and Closed Input-Output Models

References: [Please refer to the Latest Editions]

1. Allen R.G.D., *Mathematical Analysis for Economists*, Macmillan.
2. Bose D., *An Introduction of Mathematical Economics*, Himalaya Publishing House, Mumbai.
3. Chiang A.C., *Fundamental Methods of Mathematical Economics*, McGraw-Hill Higher Education.
4. Veerachami R., *Quantitative Methods for Economists*, New Age International Pub., New Delhi

Yamane Taro, *Mathematics for Economists - An Implementer Analysis*, Phi Learning Publishers.

CERTIFICATE COURSE IN BASIC STATISTICS FOR RESEARCH

Programme outcomes

This certificate course has been designed with the objective to develop in-depth knowledge of students in statistical foundations and their applications in economics and business.

Programme specific outcomes

Students will be familiar with the knowledge and application of statistical techniques for data analysis.

Course outcomes

Course is good to pursue the career as Data Analytics, Data Scientist in corporate world

Pedagogy

The topics will be covered by lecture sessions along with hands on practical training using databases and computer software SPS and STATA. The datasets (mostly economic theory based) provide students with examples to help apply the techniques studied in class to real business world problems.

Module-1: Introduction to Statistics

Types of Data - Nominal, Ordinal & Ratio-Scale Data, Qualitative and Quantitative Data, Individual, Discrete and Continuous Data - Cross Section, Time Series and Pooled Data - Sources of Data - Population and Samples - Descriptive Statistics and Inferential Statistics.

Module-2: Measures of Average and Dispersion

Measurement of Average - Arithmetic Mean, Weighted Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Quartile, Percentiles, and Mode.
Measures of Variability - Range, Inter-quartile Range, Quartile Deviation, Percentiles Deviation - Mean Deviation, Standard Deviation, and Coefficient Variation.

Module-3: Probability and Distribution

Probability Theory - Concepts and Approaches to Estimate Probability - Probability Distribution Functions - Theoretical Distribution: Normal, t, Chi-Square & F Distribution.

Module-4: Theory of Estimation and Hypothesis Testing

Concept of Estimator - Sampling Distribution of Estimator - Point and Interval Estimation - Properties of Good Estimator for Small and Large Samples.
Hypothesis Testing: Approaches to Hypothesis Testing - Confidence Interval Approach -Test of Significance Approach and P-Value Approach- Formulation of Hypothesis - Null and Alternative - Level of Significance - One Sided and Two Sided Hypothesis - Type-I and Type-II Error - Test Statistic- Critical Value - Parametric and Non-Parametric Tests.

Module-5: Correlation and Regression

Correlation: Meaning and Types of Correlation - Measurement of Correlation - Scatter Diagram - Karl Pearson‟s Coefficient of Correlation - Spearman‟s Rank Correlation - Testing of Correlation Coefficients.
Regression: Simple Regression Model - Estimation - Least Squares Method - Goodness of Fit - Introduction to Multiple Regression.

Module-6: Time Series Analysis

Nature and Decomposition of Time Series - Analysis of Trend - Polynomial Trend - Moving Average Method, Exponential Smoothening, Least-Square Method, Seasonal Component - Forecasts and their Accuracy - Root Mean Square Error.

Module-7: Index Numbers

Nature and Purpose of Index Numbers - Types of Index Numbers: Price Index - Retail Price Index - Quantity Index, Link and Chain Index - Simple and Aggregate Index Numbers: Laspeyre‟s Index, Paasche‟s Index, Marshall and Edgeworth's Index - Fisher‟s Index - Time Reversal and Factor Reversal Tests - Deflation and Splicing of Index Numbers - Problems of Construction of Index Numbers - Limitation of Index Numbers.

Practical Component:

Graphical Presentation of Data: *Tabular and Graphical Methods - Relative Frequency and Percentage - Frequency Distribution - Bar Graphs, Line Graph, Pie Charts, Histogram, Cumulative Distribution and Ogives.*

References: [Please refer to the Latest Editions]

1. Anderson, Sweeney & Williams, *Statistics for Business & Economics*, Thomson South-Western, Bangalore.
2. Gupta S P. *Statistical Methods*, S. Chand and Company, New Delhi.
3. Veerachami R. *Quantitative Methods for Economists*, New Age International Publication, New Delhi.
4. Yamane Toro, *Statistics - An Introductory Analysis*, Harper and Row Publishers, New York.

5.

CERTIFICATE COURSE IN RESEARCH METHODOLOGY

Programme outcomes

This Course will give a thorough insight to acquire research skills and capabilities. Further this course also enables the students to conducting research work

Programme specific outcomes

To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the research problem.

Course outcomes

On successful completion of the course, a student will be able to have basic awareness of data analysis-and hypothesis testing procedures

Pedagogy

The topics will be covered by lecture sessions along with seminars and hands on practical training using databases and computer software SPSS.

Module-1: Introduction to Research Process

What is Research? - Meaning and Characteristics - Types of Research - Methods - Planning a Research - Identification of Research Problem - Defining the Research Problem - Theoretical Foundation - Review of Literature - Objectives - Hypotheses - Difference between a Proposition, a Hypothesis and a Theory - Data Source - Sampling - Scope - Methodology - Logic of Inquiry - Research Design - Reference and Documentation in the Library - Need and Importance of Research in Economics - Applicability - Plagiarism - Limitations and Ethical Issues in Research.

Module-2: Types and Methods of Research

Classification of Research: Pure and Applied Research - Qualitative, Quantitative and Mixed - Exploratory, Descriptive, Diagnostic, Evaluation, Action and Experimental Research - Historical Research - Surveys - Case Study - Field Study - Steps in Research.

Module-3: Data Sources and Methods of Data Collection

Sources of Data: Primary and Secondary Sources of Data - Quantitative Data: Availability of Sources - Time Series Data - Cross Section Data and Pooled Data - Census, Reports and Documents, other Published and Unpublished Sources.
Qualitative Methods of Data Collection: Direct Observation - Indirect Observation: Interview Method, Schedules and Questionnaires - Questionnaire Designing Procedure - Case Study, Projective Methods - Simulation - Merits & Demerits.

Module-4: Sampling Considerations and Data Processing

Sampling Considerations: Concepts - Sample v/s Census - Principles of Sampling Design & Process - Types of Sample Design: Probability Sampling Techniques: Simple Random, Stratified Random, Cluster and Multi-Stage and other Methods of Sampling. Non-Probability Sampling Techniques: Quota Sampling, Convenient Sampling, Purposive Sampling, Judgment Sampling and other Methods - Determination of Sample Size - Advantages and Disadvantages - Errors in Sampling.
Data Processing: Processing and Distribution - Field Work Validation - Tabulation - Editing - Coding - Classification and Tabulation of Data - Presentation - Graphical Representation.

Module-5: Data Analysis and Interpretation (Theoretical Exposure)

Univariate and Multivariate Data Analysis - Descriptive vs Inferential Analysis - Descriptive Analysis of Univariate Data and Bivariate Data - Testing of Hypotheses: Concepts, Steps in Testing of Hypothesis.

Estimation of Mean: Test of Single Sample Mean - Two Independent Means Tests - Testing for Means of Paired Data - Testing for the Equality of K Population Means - Assumptions for Analysis of Variance - Between Treatments Estimate of Population Variance - Within Treatments Estimate of Population Variance - Comparing the Variance of Estimates - The F Test - Multiple Comparison Procedures.

Estimation of Variance: Test of Single Sample Variance - Two Sample Variance Test.

Non-Parametric Tests: Advantages & Disadvantages - Chi-square tests - Tests for Randomness.
Introduction to Advanced Data Analysis Techniques: Correlation and Regression Analysis - Factor Analysis - Discriminant Analysis - Cluster Analysis - Multidimensional Scaling.

Module-6: Report Writing and Presentation of Results

Importance of Report Writing - Types of Reports: Brief Reports, Detailed Reports, Technical Reports and Business Reports - Report Preparation - Report Structure: Preliminary Section, Main Report - Interpretations of Results - Research Findings and Suggested Recommendations - Limitations of the Study, and End Notes - Report Writing: Report Formulation - Effective Documentation: Need and Guidelines: Presenting Tabular Data, Visual Representations: Tables, Graphs, Charts - Presenting Footnotes and Bibliography - Oral Presentation of Research.

References: [Please refer to the Latest Editions]

1. Bryman Alan, *Social Research Methods*, Oxford University Press, Oxford.
2. Kothari C.R., *Research Methodology*, New Age International Publication, New Delhi.
3. Krishnawamy O.R. and Ranghanathan, M., *Methodology of Research in Social Sciences,* Himalaya Publishing House, Bangalore.
4. Kurian C.T. *Research Methodology in Economics***,** Institute of Development Studies, Madras.
5. Majumdar P.K., *Research Methods in Social Science*, Viva Books Private Limited, New Delhi.
6. Robert, A. Day, *How to Write and Publish a Scientific Paper*, Cambridge University Press, Great Britai

CERTIFICATE COURSE IN STATISTICAL SOFTWARE FOR DATA ANALYSIS

Programme outcomes

This certificate course has been designed with the objective to develop in-depth knowledge of students in statistical use of statistical software for data analysis.

This is course will not only enhance their employability but also prepare them for future challenges.

This course is basically tailored to meet this current lacuna in the research in applied economics.

Programme specific outcomes

Provide knowledge of a using of statistical software like, SPSS, Eviews and Stata in data analysis

Course outcomes

Course is good to pursue the career as Data Analytics, Data Scientist in corporate world

Pedagogy

The topics will be covered by lecture sessions along with hands on practical training using databases and computer software STATA and EVIEWS. The datasets (mostly economic theory based) provide students with examples to help apply the techniques studied in class to real business world problems.

Module-1: Introduction - Getting Started - Entering Data in the Data Viewer - Defining Variables
- Recoding Variables - Computing new Variables - Data Analysis with Statistical Software - Generating Frequency Table, Bar Chart, Pie Chart, Histogram, Arithmetic Mean, Median, Standard Deviation and Range, Contingency Table, Chi-square, and Cramer's V, Pearson's *r*, and Spearman's rho, Scatter Diagrams - Saving, Retrieving Data - Printing Output.

Module-2: Matrix and Determinants Operations - Computing Inverse Matrix, Input-Output Analysis - Construction of Different Tables - Transaction Matrix, Technical Coefficient Matrix, Computation of Values on the Basis of Problems.

Module-3: Computing, Discounting and Calculation of Present Value - Linear Programming - Procedure used in Formulating and Solving Linear Programming Problems- Graphical and Simplex Methods, Profit Maximization and Cost Minimization.

Module-4: Construction of Frequency - Generating Graphs - Histogram, Pie Charts, Bar - Graphs, Calculation of Probability, Calculation of Central Tendencies and Measures of Dispersion.

Module-5: Estimation Correlation Coefficient - Zero Correlation Matrix - Partial Correlation - Estimation of Simple Regression - Ordinary Least Squares - Estimation of Multiple Regression.

Module-6: Test of Statistical Significance - „t" Test - F Test - ANOVA Test - Chi-Square Test Construction of Index Numbers - Deflating a Series by Price Indexes - Time Series Analysis and Forecasting.

References: [Please refer to the Latest Editions]

1. Bryman Alan, *Social Research Methods*, Oxford University Press, Oxford.
2. Edward Minieka, *Statistics for Business with Computer Application,* South-Western, USA
3. Sonia Taylor, *Business Statistics*, Palgrave.

CERTIFICATE COURSE IN THEORY OF ECONOMETRICS FOR RESEARCH

Programme outcomes

This course presents some of the basic methods used in empirical research and enables students to gain understanding and practical experience so as to enhance the ability for good quality empirical work and critical evaluation of research results.

Programme specific outcomes

To provide the students with some useful tools for his/her future research.
To help the student to develop a way of thinking in quantitative terms.

Course outcomes

Course is good to pursue the career as Data Analytics, Data Scientist in corporate world

Pedagogy

The topics will be covered by lecture sessions along with hands on practical training using databases and computer software STATA and EVIEWS. The datasets (mostly economic theory based) provide students with examples to help apply the techniques studied in class to real business world problems.

Module-1: Introduction to Econometrics

Meaning - Nature and Scope of Econometrics - Distinction between Economics and Econometrics, Mathematics and Econometrics, Statistics and Econometrics - Methodology of Econometrics - Types of Econometrics.

Module-2: Simple and Multiple Regression Model

Simple Regression: Meaning - Basic Ideas - Significance of Disturbance Term. Method of Estimation: Ordinary Least Squares and Maximum Likelihood Estimation - BLUE Property - Coefficient of Determination - Assumptions - Hypothesis Testing - Confidence Interval and Test of Significance Approach - Testing Regression Coefficients - Interpretation of Results.

Multiple Regression: Meaning - Three Variable Regression Model - Partial Regression Coefficients
- Method of Estimation - R-Square and Adjusted R-Square - Hypothesis Testing - Testing Individual Regression Coefficient - Overall Significance Test - ANOVA.
Introduction to Matrix Approach to Estimation of Parameters of more than Three Variables.

Module-3: Practical Problems of Regression

Multicollinearity: Nature - Causes -Consequences - Detection - Remedial Measures. Heteroscedasticity: Nature - Causes -Consequences - Detection - Remedial Measures.Auto-Correlation: Nature - Causes -Consequences - Detection - Remedial Measures.

Module-4: Dummy Variable and Dynamic Regression Models

Dummy Variable Model: Meaning - Nature - Dummy Variable Trap - Dummy Variable Model with Single Qualitative Variable - Two Qualitative Variables - Dummy Variable Model with Mixture of Qualitative and Quantitative Variables.

Autoregressive and Dynamic Models: Role of Lag in Economics - Estimation Methods: Koyck‟s: Adaptive Adjustment and Partial Expectation Models - Almon Approach to Distributed Lag Models.

Module-5: Simultaneous Equation Models

Nature - Simultaneous Equation Bias - Identification: Under - Exact - Over Identification - Rules of Identification - Order and Rank Condition of Identification - Estimation of Simultaneous Equations Models: ILS, 2SLS, 3SLS, LIMLE, FIMLE.

References: [Please refer to the Latest Editions]

1. Damodar N Gujarati, *Basic Econometrics*, McGraw Hill, International Student Edition.
2. Damodar N Gujarati, *Econometrics by Example*, Palgrave Macmillan, United Kingdom.
3. Ghosh Sukesh K, *Econometrics- Theory and Applications*, Prentice Hall Private Ltd., New Delhi.
4. Koutsoyiannis A., *Theory of Econometrics*, The Macmillan Press Ltd., London.

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POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

[Syllabus: 2017-2018]

INSTRUCTIONS:

1. **Duration** : PG. Diploma in **Research Methodology and Quantitative Techniques for Data Analysis** is for a duration of **TWO Semesters** [i.e., ONE Year]
2. **Number of Courses** : The Programme consists of Four Courses per Semester.
3. **Total Number of Courses** : Eight Courses for Two Semesters.
4. **Number of Credits** : Number of Credits for each Course is 4 + 1 = 5
5. **Total Number of Credits** : 5 Credits for each Course x 8 Courses = 40 Credits.
6. **Teaching Hours** : For each Course: 5 Hours per week x12 weeks = 60 Hours per.
   [1 Hour Class for each Course per day x 5 Days x 12 weeks = 60 Hours per Semester]
   [4 Courses per day x 5 Days=20 Hours per week x 12 weeks = 240 Hours for 4 Courses]

   [This shall be inclusive of Theory/Application/Practical-work and seminars as required/applicable to each course depending on the content/approach by the faculty]
7. **Scheme** : Post-Graduate Diploma in **Research Methodology and Quantitative Techniques for Data Analysis** is fully Self-Finance Programme.
8. **Intake** : Minimum 30 & Maximum 60
9. **Fees Structure** : Rs. 20,000/- [@ 10,000/-Per Semester] [Basic Minimum]

Note:

- The fee prescribed by the University shall be inclusive of fee towards the Course on *Statistical Software for Data Analysis* and a supportive Course on *Fundamentals of Computers,* since there is no Computer Lab Facility in the Department and hence needs to be offered either in the Center for Information Science and Technology [CIST] or Computer Center of the University.
- The supportive course on *Fundamentals of Computers* shall be offered during the First Semester.
- Fees to be collected from the students [by the University] at the time of admission shall be included in the Fee Structure of the University.

10. **Eligibility for Admission :**

- Candidates possessing a Bachelor of Arts Degree in Social Science subjects as one of the Cognate Subjects, B.Sc., in Economics with Mathematics and/or Statistics as the Cognate Subject/s, B.Com, BBM, and Students with Masters' Degree in the Social Science subjects, M.Com. M.B.A., Degree of the University of Mysore or of any other University equivalent thereto and complying with the eligibility criteria indicated in the Admission Regulations of the University of Mysore are eligible for admission to Post-Graduate Degree Programme in M.A. Economics are eligible to pursue this Programme.

DIPLOMA IN QUANTITATIVE TECHNIQUES & RESEARCH METHODOLOGY

[Syllabus: 2017-2018]

INSTRUCTIONS:

1. **Duration** : Diploma Course on **Quantitative Techniques and Research Methodology** is for a duration of **ONE YEAR***

   - OR - Short Term Intensive Course for a duration of 2 to 6 weeks**

2. **Number of Courses** : The Programme consists of 3 Courses [to be Offered/Taught in sequence]

3. **Number of Credits** : 6 Credits + 6 Credits + 8 Credits = 20 Credits. [for 3 Courses]

4. **Teaching Hours** :*1 Hour per Day x 5 Hours per Week x 12 Weeks = 60 Hours per Course.

   - OR - Short Term Intensive Course for a duration of 2 to 6 weeks**

   [Depending upon the Requirement by the Candidates seeking to learn]

   [2 Hours per Day x 5 Days per Week x 06 Weeks = 60 Hours per Course]
   [3 Hours per Day x 5 Days per Week x 04 Weeks = 60 Hours per Course]
   [5 Hours per Day x 6 Days per Week x 02 Weeks = 60 Hours per Course]

   [This shall be inclusive of Theory/Application/Practical-work and seminars as required/applicable to each course depending on the content/approach by the faculty]

   Note: Students can pursue one course after another, and complete all the three courses within a year or two to earn a Diploma

5. **Scheme** : Fully Self Finance Programme [i.e., Scheme-B]

6. **Fees Structure** : Rs. 6,000/-

7. **Intake** : Minimum 30 & Maximum 60.

8. **Attendance** **:** 75% Attendance is mandatory for the student in each Course/Paper to appear for C3 Exam.

9. **Eligibility Criteria:**

- Students who have completed their Bachelor's Degree with Economics as one of the Cognate Subjects, B.Sc., with Mathematics or Statistics as one of the Cognate Subjects in Bachelor's Programme, B.Com, BBM and Students with Masters' Degree in Social Science, Commerce & Management are eligible to purse this Course.

10. Course Structure

DIPLOMA IN QUANTITATIVE TECHNIQUES & RESEARCH METHODS

Course No.	Title of the Certificate Course	Number of Credits	Marks for Theory	Internal Assessment	Total Marks
Diploma: I-1	Mathematics for Research	5 + 1	70	30	100
Diploma: I-2	Statistics for Research	5 + 1	70	30	100
Diploma: I-3	Research Methodology	5 + 3	100	50	150
TOTAL		**20**	**240**	**110**	**350**

11. Allocation of Marks

- **Number of Marks:** For Two Courses 100 Marks + for One Course 150 Marks
- **Total Marks for Diploma Course**: **350 Marks**

12. Number of Marks for Each Course: 100 Marks for Two Courses and 150 Marks for One Course.

- **Two Courses for 100 Marks** shall have the break up as follows:

Out of 100 Marks: **C3** = 70 Marks is for Theory Examination [Comprehensive end Semester Exam]
C1+ C2 = 15 + 15 = 30 Marks is for Continuous Assessment

30 Marks for C1 & C2 shall have the break-up as follows:

C1 : 10 Marks for the First Test + 5 Marks for Assignment.
C2 : 10 Marks for the Second Test + 5 Marks for Seminar.

- **One Course for 150 Marks** shall have the break up as follows:

Out of 150 Marks: **C3** = 100 Marks for Theory Examination [Comprehensive end Semester Exam]
C1+ C2 = 25 + 25 = 50 Marks is for Continuous Assessment

30 Marks for C1 & C2 shall have the break-up as follows:

C1 : 15 Marks for the First Test + 10 Marks for Assignment.
C2 : 15 Marks for the Second Test + 10 Marks for Seminar

Note: Minimum of 30% in C1+ C2 put together is required for a candidate to qualify for taking up C3 Examination.

Note:

1. **Diploma Course shall be offered only when the number of students seeking admission is Minimum 30.**
2. **The Diploma Course shall be offered during the I/III Semester i.e., ODD Semesters or as decided by the faculty from time to time before being notified by the University at the beginning of every academic year.**

DIPLOMA IN QUANTITATIVE TECHNIQUES For RESEARCH

[Syllabus: 2017-2018]

INSTRUCTIONS:

13. Duration : Diploma Course on **Quantitative Techniques and Research Methodology** is for a duration of **ONE YEAR***

- OR - Short Term Intensive Course for a duration of 2 to 6 weeks**

14. Number of Courses : The Programme consists of 3 Courses [to be Offered/Taught in sequence]

15. Number of Credits : 6 Credits + 6 Credits + 8 Credits = 20 Credits. [for 3 Courses]

16. Teaching Hours :*1 Hour per Day x 5 Hours per Week x 12 Weeks = 60 Hours per Course.

- OR - Short Term Intensive Course for a duration of 2 to 6 weeks**

[Depending upon the Requirement by the Candidates seeking to learn]

[2 Hours per Day x 5 Days per Week x 06 Weeks = 60 Hours per Course]
[3 Hours per Day x 5 Days per Week x 04 Weeks = 60 Hours per Course]
[5 Hours per Day x 6 Days per Week x 02 Weeks = 60 Hours per Course]

[This shall be inclusive of Theory/Application/Practical-work and seminars as required/applicable to each course depending on the content/approach by the faculty]

Note: Students can pursue one course after another, and complete all the three courses within a year or two to earn a Diploma

17. Scheme : Fully Self Finance Programme [i.e., Scheme-B]

18. Fees Structure : Rs. 6,000/-

19. Intake : Minimum 30 & Maximum 60.

20. Attendance **:** 75% Attendance is mandatory for the student in each Course/Paper to appear for C3 Exam.

21. Eligibility Criteria:

- Students who have completed their Bachelor's Degree with Economics as one of the Cognate Subjects, B.Sc., with Mathematics or Statistics as one of the Cognate Subjects in Bachelor's Programme, B.Com, BBM and Students with Masters' Degree in Social Science, Commerce & Management are eligible to purse this Course.

22. Course Structure

DIPLOMA IN QUANTITATIVE TECHNIQUES & RESEARCH METHODS

Course No.	Title of the Certificate Course	Number of Credits	Marks for Theory	Internal Assessment	Total Marks
Diploma: I-1	Mathematics for Research	5 + 1	70	30	100
Diploma: I-2	Statistics for Research	5 + 1	70	30	100
Diploma: I-3	Research Methodology	5 + 3	100	50	150
TOTAL		**20**	**240**	**110**	**350**

23. Allocation of Marks

- **Number of Marks:** For Two Courses 100 Marks + for One Course 150 Marks
- **Total Marks for Diploma Course**: **350 Marks**

24. Number of Marks for Each Course: 100 Marks for Two Courses and 150 Marks for One Course.

- **Two Courses for 100 Marks** shall have the break up as follows:

Out of 100 Marks: **C3** = 70 Marks is for Theory Examination [Comprehensive end Semester Exam]
C1+ C2 = 15 + 15 = 30 Marks is for Continuous Assessment

30 Marks for C1 & C2 shall have the break-up as follows:

C1 : 10 Marks for the First Test + 5 Marks for Assignment.
C2 : 10 Marks for the Second Test + 5 Marks for Seminar.

- **One Course for 150 Marks** shall have the break up as follows:

Out of 150 Marks: **C3** = 100 Marks for Theory Examination [Comprehensive end Semester Exam]
C1+ C2 = 25 + 25 = 50 Marks is for Continuous Assessment

30 Marks for C1 & C2 shall have the break-up as follows:

C1 : 15 Marks for the First Test + 10 Marks for Assignment.
C2 : 15 Marks for the Second Test + 10 Marks for Seminar

Note: Minimum of 30% in C1+ C2 put together is required for a candidate to qualify for taking up C3 Examination.

Note:

3. **Diploma Course shall be offered only when the number of students seeking admission is Minimum 30.**
4. **The Diploma Course shall be offered during the I/III Semester i.e., ODD Semesters or as decided by the faculty from time to time before being notified by the University at the beginning of every academic year.**

DIPLOMA IN RESEARCH METHODS, ECONOMETRICS AND STATISTICAL SOFTWARE FOR DATA ANALYSIS

[Syllabus: 2017-2018]

INSTRUCTIONS:

1. **Duration** : Diploma Course on **Research Methods, Econometrics and Statistical Software for Data Analysis** is for duration of **ONE YEAR***

   - OR - Short Term Intensive Course for a duration of 2 to 6 weeks**

2. **Number of Courses** : The Programme consists of 3 Courses [to be Offered/Taught in sequence]

3. **Number of Credits** : 6 Credits + 6 Credits + 8 Credits = 20 Credits. [for 3 Courses]

4. **Teaching Hours** :*1 Hour per Day x 5 Hours per Week x 12 Weeks = 60 Hours per Course.

   - OR - Short Term Intensive Course for a duration of 2 to 6 weeks**

   [Depending upon the Requirement by the Candidates seeking to learn]

   [2 Hours per Day x 5 Days per Week x 06 Weeks = 60 Hours per Course]
   [3 Hours per Day x 5 Days per Week x 04 Weeks = 60 Hours per Course]
   [5 Hours per Day x 6 Days per Week x 02 Weeks = 60 Hours per Course]

   [This shall be inclusive of Theory/Application/Practical-work and seminars as required/applicable to each course depending on the content/approach by the faculty]

   Note: Students can pursue one course after another, and complete all the three courses within a year or two to earn a Diploma

5. **Scheme** : Fully Self Finance Programme [i.e., Scheme-B]

6. **Fees Structure** : Rs. 6,000/-

7. **Intake** : Minimum 30 & Maximum 60.

8. **Attendance** **:** 75% Attendance is mandatory for the student in each Course/Paper to appear for C3 Exam.

9. **Eligibility Criteria:**

- Students who have completed their Bachelor's Degree with Economics as one of the Cognate Subjects, B.Sc., with Mathematics or Statistics as one of the Cognate Subjects in Bachelor's Programme, B.Com, BBM and Students with Masters' Degree in Social Science, Commerce & Management are eligible to purse this Course.

10. Course Structure

DIPLOMA IN RESEARCH METHODS, ECONOMETRICS AND STATISTICAL SOFTWARE FOR DATA ANALYSIS

Course No.	Title of the Certificate Course	Number of Credits	Marks for Theory	Internal Assessment	Total Marks
Diploma: II.1	Research Methods	6	70	30	100
Diploma: II.2	Econometrics	6	70	30	100
Diploma: II.3	Statistical Software for Data Analysis	8	100	50	150
TOTAL		**20**	**240**	**110**	**350**

11. Allocation of Marks

- **Number of Marks:** For Two Courses 100 Marks + for One Course 150 Marks
- **Total Marks for Diploma Course**: **350 Marks**

12. Number of Marks for Each Course: 100 Marks for Two Courses and 150 Marks for One Course.

- **Two Courses for 100 Marks** shall have the break up as follows:

Out of 100 Marks: **C3** =70 Marks is for Theory Examination [Comprehensive end Semester Exam]
C1+ C2=15 + 15 = 30 Marks is for Continuous Assessment

30 Marks for C1 & C2 shall have the break-up as follows:

C1 : 10 Marks for the First Test + 5 Marks for Assignment.
C2 : 10 Marks for the Second Test + 5 Marks for Seminar.

- **One Course for 150 Marks** shall have the break up as follows:

Out of 150 Marks: **C3** = 100 Marks for Theory Examination [Comprehensive end Semester Exam]
C1+ C2 = 25 + 25 = 50 Marks is for Continuous Assessment

30 Marks for C1 & C2 shall have the break-up as follows:

C1 : 15 Marks for the First Test + 10 Marks for Assignment.
C2 : 15 Marks for the Second Test + 10 Marks for Seminar

Note: Minimum of 30% in C1+ C2 put together is required for a candidate to qualify for taking up C3 Examination.

Note:

1. **Diploma Course shall be offered only when the number of students seeking admission is Minimum 30.**
2. **The Diploma Course shall be offered during the II/IV Semester i.e., EVEN Semesters or as decided by the faculty from time to time before being notified by the University at the beginning of every academic year.**

DIPLOMA IN QUANTITATIVE TECHNIQUES & RESEARCH METHODS

Programme outcomes

This diploma course has been designed with the purpose to develop the knowledge of students with various applications of mathematical tools and techniques in defining, developing and measuring economic relationships. Further to provide the statistical foundations and their applications in economics and business and this course will give a thorough insight to acquire research skills and capabilities. Further this course also enables the students to conducting research work

Programme specific outcomes

Provide knowledge of a wide range of mathematical tools and their applications in consumer and firm's behavior, production and cost analysis.
Students will be familiar with the knowledge and application of statistical techniques for data analysis.

To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the research problem.

Course outcomes

On successful completion of the course, a student will be able to quantify relationship among economic variables. Course is good to pursue the career as Data Analytics, Data Scientist in corporate world

Pedagogy

The topics will be covered by lecture sessions along with hands on practical training using databases and computer software SPS and STATA. The datasets (mostly economic theory based) provide students with examples to help apply the techniques studied in class to real business world problems.

I-Semester **Course Code: Diploma: I-1**

MATHEMATICS FOR RESEARCH

Preamble: Economics is incomplete without knowledge of mathematics, since mathematics gives flesh and blood to the subject of Economics. Mathematics for Economics deals with various applications of mathematical tools and techniques in defining and developing economic relationships. So this course, accordingly, is designed to include various mathematical methods to analyze and understand economic theories.

Module-1: Basic Mathematics for Economic Analysis

Relationship between Mathematics and Economics - Applications of Mathematics in Economic Analysis - Its Uses and Limitations - Logic, Sets and Relations - Functions -Meaning and Types: Linear and Non-Linear, Power, Exponential and Logarithm - Analytical Geometry - Simultaneous Equations - Solutions for Two Variables Application to Market Equilibrium: Derivation of Demand and Supply Functions - Marshal and Walras' Stability Conditions - Effect of Taxes and Subsidies, Indifference Curves, National Income, Interest: Compounding and Discounting, Changes in Aggregate Demand and Supply Functions, Consumption Function.

Module-2: Elementary Matrix Algebra

Basic Concepts - Types of Matrix - Matrix Operations - Transpose - Inverse Matrix -Determinants: Meaning, Properties, Rank of Matrix, Minor, Co-factor.
Functions of Several Variables - Cramer's Rule and its Applications in Economics.

Module-3: Differential and Integral Calculus

Differential Calculus**:** Limits - Derivations - Rules of Differentiation - Partial Derivatives, Total Derivatives, - Maxima and Minima for One and Two Variables.

Applications to Economic Analysis:
Consumers Behavior: Elasticity of Demand, Relationship between Price Elasticity and TR, AR and MR, Consumers' Equilibrium and Utility Maximization

Firm's Behaviour: Production Function - Cost Function - Revenue Function - Equilibrium of Firm and its Profit Maximization - Homogenous Function - Cobb-Douglas Production Function - CES Production Function - Euler's Theorem - Monopoly and Joint Production -Duopoly, Monopolistic Competition and Oligopoly.
Integral Calculus: Techniques of Integration - Definite and Indefinite Integration.

Applications to Economic Analysis: Consumer's Surplus - Producer's Surplus.

Introduction to Frontier Analysis: Technical Efficiency - Technological Change and Total Productivity - Multi-Market Equilibrium.

Module-4: Difference and Differential Equations

Difference Equations: Definitions and Concepts - Solutions to First Order and Second Order Difference Equations. Applications to Economics: Cob-web Model.

Differential Equations: Definitions and Concepts - Solutions to First Order and Second Order Differential Equations. Applications to Economics: Harrod-Domar Model, Multiplier and Accelerator.

Module-5: Linear Programming and Input-Output Analysis

Linear Programming: Basic Concepts - Constrained Optimization - Formulation of Linear Programming Problem - Nature of Feasible and Optimal Solutions - Solution through Graphical Methods - Introduction to Simplex method - Duality Theorem.
Input-Output Analysis: Basic Concepts, Static, Open and Closed Input-Output Models

References: [Please refer to the Latest Editions]

1. Allen R.G.D., *Mathematical Analysis for Economists*, Macmillan.
2. Bose D., *An Introduction of Mathematical Economics*, Himalaya Publishing House, Mumbai.
3. Chiang A.C., *Fundamental Methods of Mathematical Economics*, McGraw-Hill Higher Education.
4. Veerachami R., *Quantitative Methods for Economists*, New Age International Pub., New Delhi
5. Yamane Taro, *Mathematics for Economists - An Implementer Analysis*, Phi Learning Publishers.

DIPLOMA IN QUANTITATIVE TECHNIQUES & RESEARCH METHODS

I-Semester **Course Code: Diploma: I-2**

STATISTICS FOR RESEARCH

Module-1: Introduction to Statistics

Types of Data - Nominal, Ordinal & Ratio-Scale Data, Qualitative and Quantitative Data, Individual, Discrete and Continuous Data - Cross Section, Time Series and Pooled Data - Sources of Data - Population and Samples - Descriptive Statistics and Inferential Statistics.

Module-2: Measures of Average and Dispersion

Measurement of Average - Arithmetic Mean, Weighted Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Quartile, Percentiles, and Mode.
Measures of Variability - Range, Inter-quartile Range, Quartile Deviation, Percentiles Deviation - Mean Deviation, Standard Deviation, and Coefficient Variation.

Module-3: Probability and Distribution

Probability Theory - Concepts and Approaches to Estimate Probability - Probability Distribution Functions - Theoretical Distribution: Normal, t, Chi-Square & F Distribution.

Module-4: Theory of Estimation and Hypothesis Testing

Concept of Estimator - Sampling Distribution of Estimator - Point and Interval Estimation - Properties of Good Estimator for Small and Large Samples.
Hypothesis Testing: Approaches to Hypothesis Testing - Confidence Interval Approach -Test of Significance Approach and P-Value Approach- Formulation of Hypothesis - Null and Alternative - Level of Significance - One Sided and Two Sided Hypothesis - Type-I and Type-II Error - Test Statistic- Critical Value - Parametric and Non-Parametric Tests.

Module-5: Correlation and Regression

Correlation: Meaning and Types of Correlation - Measurement of Correlation - Scatter Diagram - Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Testing of Correlation Coefficients.
Regression: Simple Regression Model - Estimation - Least Squares Method - Goodness of Fit - Introduction to Multiple Regression.

Module-6: Time Series Analysis

Nature and Decomposition of Time Series - Analysis of Trend - Polynomial Trend - Moving Average Method, Exponential Smoothening, Least-Square Method, Seasonal Component - Forecasts and their Accuracy - Root Mean Square Error.

Module-7: Index Numbers

Nature and Purpose of Index Numbers - Types of Index Numbers: Price Index - Retail Price Index - Quantity Index, Link and Chain Index - Simple and Aggregate Index Numbers: Laspeyre's Index, Paasche's Index, Marshall and Edgeworth's Index - Fisher's Index - Time Reversal and Factor Reversal Tests - Deflation and Splicing of Index Numbers - Problems of Construction of Index Numbers - Limitation of Index Numbers.

Practical Component:

Graphical Presentation of Data: *Tabular and Graphical Methods - Relative Frequency and Percentage - Frequency Distribution - Bar Graphs, Line Graph, Pie Charts, Histogram, Cumulative Distribution and Ogives.*

References: [Please refer to the Latest Editions]

1. Anderson, Sweeney & Williams, *Statistics for Business & Economics*, Thomson South-Western, Bangalore.
2. Gupta S P. *Statistical Methods*, S. Chand and Company, New Delhi.
3. Veerachami R. *Quantitative Methods for Economists*, New Age International Pub., New Delhi.
4. Yamane Toro, *Statistics - An Introductory Analysis*, Harper and Row Publishers, New York.

DIPLOMA IN QUANTITATIVE TECHNIQUES & RESEARCH METHODS

I-Semester **Course Code: Diploma: I-3**

RESEARCH METHODOLOGY

Module - 1: Introduction to Research Process

What is Research? - Meaning and Characteristics - Types of Research - Methods - Planning a Research - Identification of Research Problem - Defining the Research Problem - Theoretical Foundation - Review of Literature - Objectives - Hypotheses - Difference between a Proposition, a Hypothesis and a Theory - Data Source - Sampling - Scope - Methodology - Logic of Inquiry - Research Design - Reference and Documentation in the Library - Need and Importance of Research in Economics - Applicability - Plagiarism - Limitations and Ethical Issues in Research.

Module - 2: Types and Methods of Research

Classification of Research: Pure and Applied Research - Qualitative, Quantitative and Mixed - Exploratory, Descriptive, Diagnostic, Evaluation, Action and Experimental Research - Historical Research - Surveys - Case Study - Field Study - Steps in Research.

Module - 3: Data Sources and Methods of Data Collection

Sources of Data: Primary and Secondary Sources of Data - Quantitative Data: Availability of Sources - Time Series Data - Cross Section Data and Pooled Data - Census, Reports and Documents, other Published and Unpublished Sources.
Qualitative Methods of Data Collection: Direct Observation - Indirect Observation: Interview Method, Schedules and Questionnaires - Questionnaire Designing Procedure - Case Study, Projective Methods - Simulation - Merits & Demerits.

Module - 4: Sampling Considerations and Data Processing

Sampling Considerations: Concepts - Sample v/s Census - Principles of Sampling Design & Process - Types of Sample Design: Probability Sampling Techniques: Simple Random, Stratified Random, Cluster and Multi-Stage and other Methods of Sampling. Non-Probability Sampling Techniques: Quota Sampling, Convenient Sampling, Purposive Sampling, Judgment Sampling and other Methods - Determination of Sample Size - Advantages and Disadvantages - Errors in Sampling.
Data Processing: Processing and Distribution - Field Work Validation - Tabulation - Editing - Coding - Classification and Tabulation of Data - Presentation - Graphical Representation.

Module-5: Report Writing and Presentation of Results

Importance of Report Writing - Types of Reports: Brief Reports, Detailed Reports, Technical Reports and Business Reports - Report Preparation - Report Structure: Preliminary Section, Main Report - Interpretations of Results - Research Findings and Suggested Recommendations - Limitations of the Study, and End Notes - Report Writing: Report Formulation - Effective Documentation: Need and Guidelines: Presenting Tabular Data, Visual Representations: Tables, Graphs, Charts - Presenting Footnotes and Bibliography - Oral Presentation of Research.

References: [Please refer to the Latest Editions]

1. Bryman Alan, *Social Research Methods*, Oxford University Press, Oxford.
2. Kothari C.R., *Research Methodology*, New Age International Publication, New Delhi.
3. Krishnawamy O.R. and Ranghanathan, M., *Methodology of Research in Social Sciences*, Himalaya Publishing House, Bangalore.
4. Kurian C.T. *Research Methodology in Economics***,** Institute of Development Studies, Madras.
5. Majumdar P.K., *Research Methods in Social Science*, Viva Books Private Limited, New Delhi.
6. Robert, A. Day, *How to Write and Publish a Scientific Paper*, Cambridge University Press, Great Britain.

UNIVERSITY OF MYSORE

DEPARTMENT OF STUDIES IN ECONOMICS AND CO-OPERATION
MANASAGANGOTRI, MYSURU-570 006

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

[Syllabus: 2017-2018]

INSTRUCTIONS:

11. Duration : PG. Diploma in **Research Methodology and Quantitative Techniques for Data Analysis** is for a duration of **TWO Semesters** [i.e., ONE Year]

12. Number of Courses : The Programme consists of Four Courses per Semester.

13. Total Number of Courses : Eight Courses for Two Semesters.

14. Number of Credits : Number of Credits for each Course is 4 + 1 = 5

15. Total Number of Credits : 5 Credits for each Course x 8 Courses = 40 Credits.

16. Teaching Hours : For each Course: 5 Hours per week x12 weeks = 60 Hours per.
[1 Hour Class for each Course per day x 5 Days x 12 weeks = 60 Hours per Semester]
[4 Courses per day x 5 Days=20 Hours per week x 12 weeks = 240 Hours for 4 Courses]

[This shall be inclusive of Theory/Application/Practical-work and seminars as required/applicable to each course depending on the content/approach by the faculty]

17. Scheme : Post-Graduate Diploma in **Research Methodology and Quantitative Techniques for Data Analysis** is fully Self-Finance Programme.

18. Intake : Minimum 30 & Maximum 60

19. Fees Structure : Rs. 20,000/- [@ 10,000/-Per Semester] [Basic Minimum]

Note:

- The fee prescribed by the University shall be inclusive of fee towards the Course on *Statistical Software for Data Analysis* and a supportive Course on *Fundamentals of Computers,* since there is no Computer Lab Facility in the Department and hence needs to be offered either in the Center for Information Science and Technology [CIST] or Computer Center of the University.
- The supportive course on *Fundamentals of Computers* shall be offered during the First Semester.
- Fees to be collected from the students [by the University] at the time of admission shall be included in the Fee Structure of the University.

20. Eligibility for Admission :

- Candidates possessing a Bachelor of Arts Degree in Social Science subjects as one of the Cognate Subjects, B.Sc., in Economics with Mathematics and/or Statistics as the Cognate Subject/s, B.Com, BBM, and Students with Masters' Degree in the Social Science subjects, M.Com. M.B.A., Degree of the University of Mysore or of any other University equivalent thereto and complying with the eligibility criteria indicated in the Admission Regulations of the University of Mysore are eligible for admission to Post-Graduate Degree Programme in M.A. Economics are eligible to pursue this Programme.

COURSE STRUCTURE

I-SEMESTER

Course No.	Course Code	Title of the Course	No. of Credits	Marks for Theory	Internal Assessment	Total Marks
1	I-HC: 1	Mathematics for Research	4 + 1	70	30	100
2	I-HC: 2	Statistics for Research	4 + 1	70	30	100
3	I-SC: 3	Research Methodology	4 + 1	70	30	100
4	I-SC: 3	Computer Basics	4 + 1	70	30	100
TOTAL			**20**	**280**	**120**	**400**

[Preferably to be offered during the Months from September to December (During I/III Semester)]

II-SEMESTER

Course No.	Course Code	Title of the Course	No. of Credits	Marks for Theory	Internal Assessment	Total Marks
1	II-HC: 1	Theory of Econometrics	4 + 1	70	30	100
2	II-HC: 2	Applied Econometrics	4 + 1	70	30	100
3	II-SC: 3	Statistical Software for Data Analysis	4 + 1	70	30	100
4	II-SC: 4	Project Work	4 + 1	70	30	100
TOTAL			**20**	**280**	**120**	**400**

[Preferably to be offered during the Months from February to April (During II/IV Semester)]

21. Statistical Software for Data Analysis*

A Course on "Statistical Software for Data Analysis" offered during the Second Semester is Practical Computer Lab Oriented and this course is essential for the students since it would be useful for pursing M.Phil, or Ph.D., Research or for skill based professions.

- Practical Examination relating to *Statistical Software for Data Analysis* [at the end of the Second semester] shall be for 100 Marks.
- A Supportive Course on *Fundamentals of Computers* [to be completed in I-Semester] is a must for the students to pursue the Core Course on *Statistical Software for Data Analysis* in the Second Semester**.**
- **There shall be an additional fee component for the Course on** *"Statistical Software for Data Analysis"* and a supportive Course on "*Fundamentals of Computers"* since there is no Computer Lab Facility in the Department. Hence, it needs to be offered either in the Center for Information Science and Technology [CIST] or Computer Center of the University.
- The Fee prescribed by the University shall be inclusive of the supportive course on *Fundamentals of Computers*, which shall be offered preferably during the I-Semester.
- Fees to be collected from the students [by the University] at the time of admission shall be included in the Fee Structure of the University.

22. Project Work

- **Project Work** shall be for 100 Marks.
- Topic for the **Project Work** can be selected by the Students or suggested by the Faculty at the beginning of the First Semester.
- The Project Work will have to be submitted by the Students to the Department before the end of the II-Semester [i.e., on or before the last working day of the Semester].

Component-1	(C1)	: Periodic Progress and Reports	[15 Marks]
Component-2	(C2)	: Results of the Work and Draft & Final Report	[15 Marks]
Component-3:	(C3)	: Final Viva Voce and Evaluation	[20 Marks]
Project Report		: One Copy to be submitted	[50 Marks]

23. Viva-Voce Examination

- Viva-Voce shall be conducted on the Project Work submitted by the students in the Second Semester.
- Viva-Voce Examination shall be conducted in Department of Studies in Economics & Cooperation within a week or two after the completion of the Second semester examination.
- Viva-Voce Committee shall comprise of: (i) The Chairperson, (ii) Concerned Supervisor of the Project, and (iii) Three other faculty members from the Department.
- One External Examiner from other universities within Karnataka [as decided by the Department Council] shall be invited for conducting of Viva-Voce Examination.
- Marks for the Viva-Voce Exam shall be the average of marks given by all the examiners.
- Consolidated Marks List [consisting of the marks given by each examiner] shall be sent to the University preferably on the same day or immediate next working day.

24. Allocation of Marks:

- **Total Marks** for P.G. Diploma Programme : **800 Marks** [400 Marks for Each Semester]
- **Number of Marks for Each Course: 100 Marks**

  Out of 100 Marks: **C3** = 70 Marks is for Theory Examination [Comprehensive end Semester Exam]
  C1 + C2 = 15 + 15 = 30 Marks is for Continuous Assessment [for all the Courses in 4 Semesters]
- 30 Marks for C1 & C2 shall have the break-up as follows:

  C1 : 10 Marks for the First Test + 5 Marks for Assignment [all the Courses in 4 Semesters]
  C2 : 10 Marks for the Second Test + 5 Marks for Seminar [all the Courses in 4 Semesters]

Note: Minimum of 30% in C1+ C2 put together is required for a candidate to qualify for taking up C3 Examination.

25. Attendance:

- 75% Attendance is mandatory for the student in each Course/Paper to appear for C3 Exam.
- In case a candidate secures less than 30% in C1 and C2 put together in a course, the candidate is said to have DROPPED the course and is not allowed to appear for C3 in the Course.
- In case a candidate secures less than 30% in C3, he/she may choose DROP/MAKE-UP option.

Note:

- Introduction of Post Graduate Diploma in **Research Methodology and Quantitative Techniques for Data Analysis** depends on the number of students seeking admission/enrolled for the programme.
- P.G. Diploma Programme shall be offered only when a minimum of 30 students get enrolled to it. This is due to (i) financial viability and (ii) technical expertise required for offering the Courses.
- Further, it shall depend on the availability of faculty with the expertise to offer the courses and availability of technical support from the Computer Center or Center for Information Science and Technology (CIST), University of Mysore.
- The Programme shall only be offered from the beginning of the Odd Semester i.e., I & III Semesters.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

Programme outcomes

This Course will give a thorough insight to acquire research skills and capabilities. Further this course also enables the students to conducting research work

This certificate course has been designed with the objective to develop in-depth knowledge of students in statistical use of statistical software for data analysis.

This is course will not only enhance their employability but also prepare them for future challenges.

This course is basically tailored to meet this current lacuna in the research in applied economics.

Programme specific outcomes

To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation to the data sets so as to solve the research problem.

Provide knowledge of a using of statistical software like, SPSS, Eviews and Stata in data analysis

Course outcomes

On successful completion of the course, a student will be able to have basic awareness of data analysis-and hypothesis testing procedures Course is good to pursue the career as Data Analytics, Data Scientist in corporate world

Pedagogy

The topics will be covered by lecture sessions along with hands on practical training using databases and computer software SPSS, STATA and EVIEWS. The datasets (mostly economic theory based) provide students with examples to help apply the techniques studied in class to real business world problems.

I-SEMESTER Course No: 1 (Hard Core)

Course Code: (I-HC: 1) MATHEMATICS FOR RESEARCH

Preamble: Economics is incomplete without knowledge of mathematics, since mathematics gives flesh and blood to the subject of Economics. Mathematics for Economics deals with various applications of mathematical tools and techniques in defining and developing economic relationships. So this course, accordingly, is designed to include various mathematical methods to analyze and understand economic theories.

Module-1: Basic Mathematics for Economic Analysis

Relationship between Mathematics and Economics - Applications of Mathematics in Economic Analysis - Its Uses and Limitations - Logic, Sets and Relations - Functions -Meaning and Types: Linear and Non-Linear, Power, Exponential and Logarithm - Analytical Geometry - Simultaneous Equations - Solutions for Two Variables Application to Market Equilibrium: Derivation of Demand and Supply Functions - Marshal and Walras' Stability Conditions - Effect of Taxes and Subsidies, Indifference Curves, National Income, Interest: Compounding and Discounting, Changes in Aggregate Demand and Supply Functions, Consumption Function.

Module-2: Elementary Matrix Algebra

Basic Concepts - Types of Matrix - Matrix Operations - Transpose - Inverse Matrix -Determinants: Meaning, Properties, Rank of Matrix, Minor, Co-factor.
Functions of Several Variables - Cramer's Rule and its Applications in Economics.

Module-3: Differential and Integral Calculus

Differential Calculus**:** Limits - Derivations - Rules of Differentiation - Partial Derivatives, Total Derivatives, - Maxima and Minima for One and Two Variables.

Applications to Economic Analysis:
Consumers Behavior: Elasticity of Demand, Relationship between Price Elasticity and TR, AR and MR, Consumers' Equilibrium and Utility Maximization

Firm's Behaviour: Production Function - Cost Function - Revenue Function - Equilibrium of Firm and its Profit Maximization - Homogenous Function - Cobb-Douglas Production Function - CES Production Function - Euler's Theorem - Monopoly and Joint Production -Duopoly, Monopolistic Competition and Oligopoly.
Integral Calculus: Techniques of Integration - Definite and Indefinite Integration.

Applications to Economic Analysis: Consumer's Surplus - Producer's Surplus.

Introduction to Frontier Analysis: Technical Efficiency - Technological Change and Total Productivity - Multi-Market Equilibrium.

Module-4: Difference and Differential Equations

Difference Equations: Definitions and Concepts - Solutions to First Order and Second Order Difference Equations. Applications to Economics: Cob-web Model.

Differential Equations: Definitions and Concepts - Solutions to First Order and Second Order Differential Equations. Applications to Economics: Harrod-Domar Model, Multiplier and Accelerator.

Module-5: Linear Programming and Input-Output Analysis

Linear Programming: Basic Concepts - Constrained Optimization - Formulation of Linear Programming Problem - Nature of Feasible and Optimal Solutions - Solution through Graphical Methods - Introduction to Simplex method - Duality Theorem.
Input-Output Analysis: Basic Concepts, Static, Open and Closed Input-Output Models

References: [Please refer to the Latest Editions]

1. Allen R.G.D., *Mathematical Analysis for Economists*, Macmillan.
2. Bose D., *An Introduction of Mathematical Economics*, Himalaya Publishing House, Mumbai.
3. Chiang A.C., *Fundamental Methods of Mathematical Economics*, McGraw-Hill Higher Education.
4. Veerachami R., *Quantitative Methods for Economists*, New Age International Pub., New Delhi
5. Yamane Taro, *Mathematics for Economists - An Implementer Analysis*, Phi Learning Publishers.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

I - SEMESTER Course No: 2 (Hard Core)

Course Code: (I-HC: 2) STATISTICS FOR RESEARCH

Preamble: Economics has become more and more analytic over the years, requiring sufficient knowledge of quantitative methods. To meet this requirement, a course in Statistics for Economics is absolutely essential. This course will help the student in data collection, presentation, analyses and drawing inferences about various statistical hypotheses. Further, it helps to develop the analytical skills in the student.

Module-1: Introduction to Statistics

Types of Data - Nominal, Ordinal & Ratio-Scale Data, Qualitative and Quantitative Data, Individual, Discrete and Continuous Data - Cross Section, Time Series and Pooled Data - Sources of Data - Population and Samples - Descriptive Statistics and Inferential Statistics.

Module-2: Measures of Average and Dispersion

Measurement of Average - Arithmetic Mean, Weighted Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Quartile, Percentiles, and Mode.
Measures of Variability - Range, Inter-quartile Range, Quartile Deviation, Percentiles Deviation - Mean Deviation, Standard Deviation, and Coefficient Variation.

Module-3: Probability and Distribution

Probability Theory - Concepts and Approaches to Estimate Probability - Probability Distribution Functions - Theoretical Distribution: Normal, t, Chi-Square & F Distribution.

Module-4: Theory of Estimation and Hypothesis Testing

Concept of Estimator - Sampling Distribution of Estimator - Point and Interval Estimation - Properties of Good Estimator for Small and Large Samples.
Hypothesis Testing: Approaches to Hypothesis Testing - Confidence Interval Approach -Test of Significance Approach and P-Value Approach- Formulation of Hypothesis - Null and Alternative - Level of Significance - One Sided and Two Sided Hypothesis - Type-I and Type-II Error - Test Statistic- Critical Value - Parametric and Non-Parametric Tests.

Module-5: Correlation and Regression

Correlation: Meaning and Types of Correlation - Measurement of Correlation - Scatter Diagram - Karl Pearson's Coefficient of Correlation - Spearman's Rank Correlation - Testing of Correlation Coefficients.
Regression: Simple Regression Model - Estimation - Least Squares Method - Goodness of Fit - Introduction to Multiple Regression.

Module-6: Time Series Analysis

Nature and Decomposition of Time Series - Analysis of Trend - Polynomial Trend - Moving Average Method, Exponential Smoothening, Least-Square Method, Seasonal Component - Forecasts and their Accuracy - Root Mean Square Error.

Module-7: Index Numbers

Nature and Purpose of Index Numbers - Types of Index Numbers: Price Index - Retail Price Index - Quantity Index, Link and Chain Index - Simple and Aggregate Index Numbers: Laspeyre's Index, Paasche's Index, Marshall and Edgeworth's Index - Fisher's Index - Time Reversal and Factor Reversal Tests - Deflation and Splicing of Index Numbers - Problems of Construction of Index Numbers - Limitation of Index Numbers.

Practical Component:

Graphical Presentation of Data: *Tabular and Graphical Methods - Relative Frequency and Percentage - Frequency Distribution - Bar Graphs, Line Graph, Pie Charts, Histogram, Cumulative Distribution and Ogives.*

References: [Please refer to the Latest Editions]

1. Anderson, Sweeney & Williams, *Statistics for Business & Economics,* Thomson South-Western, Bangalore.
2. Gupta S P. *Statistical Methods,* S. Chand and Company, New Delhi.
3. Veerachami R. *Quantitative Methods for Economists,* New Age International Pub., New Delhi.
4. Yamane Toro, *Statistics - An Introductory Analysis,* Harper and Row Publishers, New York.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

I - SEMESTER Course No: 3 (Soft Core)

Course Code: (I-SC: 3)

RESEARCH METHODOLOGY

Preamble: Research as defined in Webster's 'new international dictionary' consists of "careful or critical inquiry or examination in seeking facts or principles; diligent investigation in order to ascertain something". This emphasis of the fact that - research in its broader sense is a purposive investigation or inquiry. The main purpose of research is to describe, interpret and explain phenomena by relating it to other phenomena, thereby setting it within its proper context and by making its meaning or sense explicit through its chain of interconnections. This Course will give a thorough insight to acquire research skills and capabilities.

Module - 1: Introduction to Research Process

What is Research? - Meaning and Characteristics - Types of Research - Methods - Planning a Research - Identification of Research Problem - Defining the Research Problem - Theoretical Foundation - Review of Literature - Objectives - Hypotheses - Difference between a Proposition, a Hypothesis and a Theory - Data Source - Sampling - Scope - Methodology - Logic of Inquiry - Research Design - Reference and Documentation in the Library - Need and Importance of Research in Economics - Applicability - Plagiarism - Limitations and Ethical Issues in Research.

Module - 2: Types and Methods of Research

Classification of Research: Pure and Applied Research - Qualitative, Quantitative and Mixed - Exploratory, Descriptive, Diagnostic, Evaluation, Action and Experimental Research - Historical Research - Surveys - Case Study - Field Study - Steps in Research.

Module - 3: Data Sources and Methods of Data Collection

Sources of Data: Primary and Secondary Sources of Data - Quantitative Data: Availability of Sources - Time Series Data - Cross Section Data and Pooled Data - Census, Reports and Documents, other Published and Unpublished Sources.
Qualitative Methods of Data Collection: Direct Observation - Indirect Observation: Interview Method, Schedules and Questionnaires - Questionnaire Designing Procedure - Case Study, Projective Methods - Simulation - Merits & Demerits.

Module - 4: Sampling Considerations and Data Processing

Sampling Considerations: Concepts - Sample v/s Census - Principles of Sampling Design & Process - Types of Sample Design: Probability Sampling Techniques: Simple Random, Stratified Random, Cluster and Multi-Stage and other Methods of Sampling. Non-Probability Sampling Techniques: Quota Sampling, Convenient Sampling, Purposive Sampling, Judgment Sampling and other Methods - Determination of Sample Size - Advantages and Disadvantages - Errors in Sampling.
Data Processing: Processing and Distribution - Field Work Validation - Tabulation - Editing - Coding - Classification and Tabulation of Data - Presentation - Graphical Representation.

Module - 5: Data Analysis and Interpretation (Theoretical Exposure)

Univariate and Multivariate Data Analysis - Descriptive vs Inferential Analysis - Descriptive Analysis of Univariate Data and Bivariate Data - Testing of Hypotheses: Concepts, Steps in Testing of Hypothesis.

Estimation of Mean: Test of Single Sample Mean - Two Independent Means Tests - Testing for Means of Paired Data - Testing for the Equality of K Population Means - Assumptions for Analysis of Variance - Between Treatments Estimate of Population Variance - Within Treatments Estimate of Population Variance - Comparing the Variance of Estimates - The F Test - Multiple Comparison Procedures.

Estimation of Variance: Test of Single Sample Variance - Two Sample Variance Test.

Non-Parametric Tests: Advantages & Disadvantages - Chi-square tests - Tests for Randomness.
Introduction to Advanced Data Analysis Techniques: Correlation and Regression Analysis - Factor Analysis - Discriminant Analysis - Cluster Analysis - Multidimensional Scaling.

Module - 6: Report Writing and Presentation of Results

Importance of Report Writing - Types of Reports: Brief Reports, Detailed Reports, Technical Reports and Business Reports - Report Preparation - Report Structure: Preliminary Section, Main Report - Interpretations of Results - Research Findings and Suggested Recommendations - Limitations of the Study, and End Notes - Report Writing: Report Formulation - Effective Documentation: Need and Guidelines: Presenting Tabular Data, Visual Representations: Tables, Graphs, Charts - Presenting Footnotes and Bibliography - Oral Presentation of Research.

References: [Please refer to the Latest Editions]

1. Bryman Alan, *Social Research Methods*, Oxford University Press, Oxford.
2. Kothari C.R., *Research Methodology*, New Age International Publication, New Delhi.
3. Krishnawamy O.R. & Ranghanathan, M., *Methodology of Research in Social Sciences*, Himalaya Pub.lishing House, Bangalore.
4. Kurian C.T. *Research Methodology in Economics***,** Institute of Development Studies, Madras.
5. Majumdar P.K., *Research Methods in Social Science*, Viva Books Private Limited, New Delhi.
6. Robert, A. Day, *How to Write and Publish a Scientific Paper*, Cambridge University Press, Great Britain.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

I - SEMESTER Course No: 4 (Soft Core)

Course Code: (I-SC: 4) COMPUTER BASICS

[A SUPPORTIVE COURSE TO **STATISTICAL SOFTWARE FOR DATA ANALYSIS]**

Module - 1: Introduction to Digital Computers

Historical Perspective of Computer Development - Generation of Computers - System Logical Organization - Number Systems: Binary, Octal, Hexadecimal.

Module - 2: Computer Hardware

Fundamentals of Computers - Organization and Components of Computers - Computer Hardware - Input Devices: Keyboard, Mouse, and VDU - Output Devices: Printers (various types), Plotter and Monitor, Scanner, Digitizer etc., - Secondary Storage Devices: Floppy Disk, Hard Disk and CD ROM - Specification of peripherals and Computers.

Module - 3: Computer Software

Different Types of Software, Translator and Compilers - Application Software - Algorithms and Flow Chart - Programming Language - Errors - Types - Introduction Operating System and Utilities.

Module - 4: Computing Environment

Types of Computers: Micro Computers, Mini Computers, Main Frame Computers, Desk Top Computers, Note Book Computers and Work Stations - Computer Networks - Brief Introduction to LAN, WAN and Internet.

Module - 5: Office Automation

Various Types of Operating System - MS DOS, Basic Commands - Windows 1998 and 2000 - Introduction - Working with Windows - Copying, Creating, Deleting Files and Folders in Windows - Introduction to Window Application - Programme - MS Office - Word, Excel and Power Point - Information Integrity Ensuring Integrity - Computer Security - Preventive Measures and Treatment.

Module-6: Data Processing and Data Management

Inputting Data from the Keyboard - Creating File in Microsoft Excel - Loading of existing Data Set - Inputting Data from Raw Data File - Copying Data from Microsoft Excel to Clipboard - Adding Two Sheets/Files, Editing Files - Printing, Saving and Copying Edited Files.

Module-7: File Processing

File Processing - Sorting - Searching - Merging - Summarizing - Direct Access - Storage - Retrieval - File Organization Techniques - Documentation Debugging Storage and Time Execution Estimation - System Security.

Module-8: Internet

Introduction to Internet - World Wide Web - Electronic Mail - Browsing the Web - Utilities - Tools and Techniques - Introduction to e-Commerce - e-payment-e-security- e-Governance - e-economics.

References: [Please refer to the Latest Editions]

1. Reader's Digest, *How to Do Just Anything on a Computer,* London.
2. Saxena Sanjay, *A First Course in Computers,* Vikas Pub., House Private Ltd, New Delhi.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

II - SEMESTER Course No: 1 (Hard Core)

Course Code: (II-HC: 1) THEORY OF ECONOMETRICS

Preamble: The explosive growth in econometric literature in the last few decades hardly needs any emphasis. Introduction of this Course can be viewed as an attempt to expose the students to the basic concepts of econometrics. Keeping this in mind, the focus of this Course will be on a meaningful interface between theory and application - the emphasis being more on empirical analysis rather than theoretical rigour.

Module - 1: Introduction to Econometrics

Meaning - Nature and Scope of Econometrics - Distinction between Economics and Econometrics, Mathematics and Econometrics, Statistics and Econometrics - Methodology of Econometrics - Types of Econometrics.

Module - 2: Simple and Multiple Regression Model

Simple Regression: Meaning - Basic Ideas - Significance of Disturbance Term. Method of Estimation: Ordinary Least Squares and Maximum Likelihood Estimation - BLUE Property - Coefficient of Determination - Assumptions - Hypothesis Testing - Confidence Interval and Test of Significance Approach - Testing Regression Coefficients - Interpretation of Results.

Multiple Regression: Meaning - Three Variable Regression Model - Partial Regression Coefficients - Method of Estimation - R-Square and Adjusted R-Square - Hypothesis Testing - Testing Individual Regression Coefficient - Overall Significance Test - ANOVA.
Introduction to Matrix Approach to Estimation of Parameters of more than Three Variables.

Module - 3: Practical Problems of Regression

Multicollinearity: Nature - Causes -Consequences - Detection - Remedial Measures.
Heteroscedasticity: Nature - Causes -Consequences - Detection - Remedial Measures.
Auto-Correlation: Nature - Causes -Consequences - Detection - Remedial Measures.

Module - 4: Dummy Variable and Dynamic Regression Models

Dummy Variable Model: Meaning - Nature - Dummy Variable Trap - Dummy Variable Model with Single Qualitative Variable - Two Qualitative Variables - Dummy Variable Model with Mixture of Qualitative and Quantitative Variables.

Autoregressive and Dynamic Models: Role of Lag in Economics - Estimation Methods: Koyck's: Adaptive Adjustment and Partial Expectation Models - Almon Approach to Distributed Lag Models.

Module - 5: Simultaneous Equation Models

Nature - Simultaneous Equation Bias - Identification: Under - Exact - Over Identification - Rules of Identification - Order and Rank Condition of Identification - Estimation of Simultaneous Equations Models: ILS, 2SLS, 3SLS, LIMLE, FIMLE.

References: [Please refer to the Latest Editions]

1. Damodar N Gujarati, *Basic Econometrics*, McGraw Hill, International Student Edition.
2. Damodar N Gujarati, *Econometrics by Example*, Palgrave Macmillan, United Kingdom.
3. Ghosh Sukesh K, *Econometrics- Theory and Applications*, Prentice Hall Private Ltd., New Delhi.
4. Koutsoyiannis A., *Theory of Econometrics*, The Macmillan Press Ltd., London.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

II - SEMESTER Course No: 2 (Core Course)

Course Code: (II-HC: 2) APPLIED ECONOMETRICS

Preamble: This course covers the statistical foundations of econometric theory as well as econometric methods and applications. The focus of this course will be therefore on an interface between these three facets that are essential for a proper understanding of econometric applications in economic analysis.

Module - 1: Qualitative Dependent Variable Models

Nature of Qualitative Variables - Linear Probability Model - Logit Model - Probit Model - Tobit Model for Grouped and Ungrouped Data - Their Application in Economics.

Module - 2: Time Series Econometrics

Introduction - Stationary and Non-Stationary Series - Random Walk Model - Testing of Unit Root - Co-integration - Test for Co-integration - Engel-Granger Test - Johansen Test - Error Correction Model - Introduction to ARCH and GARCH Modeling - Their Application in Economics.

Module - 3: Panel Data Models

Why Panel Data? - Estimation - Fixed Effects Method - All Coefficient Constant across Time and Individuals - Slope Coefficients Constant but Intercept Varies across Individuals - Slope Coefficients Constant but Intercept Varies Over Individuals as Well as Time - All Coefficients Vary across Individuals - Random Effects Method - Fixed Effects v/s Random Effects Model - Hausman Test - Their Application in Economics.

Module - 4: Empirical Demand, Production and Investment Analysis

Static Single Equations - Demand Analysis - Theoretical Foundations of Demand Analysis - Utility Theory - Tobin's Study- Static Multiple Equations - Production Function - Neoclassical Production Function - Cobb-Douglas Production Function - CES Production Function - Dynamic Single Equation Model - Investment Behaviour Models - Meyer and Kuh Model - Kuh Model

Module - 5: Econometric Applications in India

Econometric Applications in Indian Demand Analysis - Indian Agriculture - Indian Industry - International Trade.

References: [Please refer to the Latest Editions]

1. Brooks Chris, *Introductory Econometrics for Finance*, Cambridge University Press, Cambridge.
2. Desai Meghnad, *Applied Econometrics*, McGraw Hill Publishing Company Ltd.
3. Gujarathi Damodar, *Basic Econometrics*, McGraw Hill, International Student Edition.
4. Krishna K. L., *Indian Econometrics Models*, Oxford University Press, Oxford.
5. Patterson Kerry, *An Introduction to Applied Econometrics a Time Series Approach*, Macmillan Press.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

II - SEMESTER Course No: 3 (Supportive Course)

Course Code: (II-SC: 3) STATISTICAL SOFTWARE FOR DATA ANALYSIS

Preamble: In the era of information technology proper use of information technology in most of the disciplines has become a necessity. Economics being as empirical science, computer has emerged as the pivotal instrument for economic analysis, research and forecasting. Given the highly quantitative aspect of research in economics, it becomes imperative for students to equip themselves with a basic knowledge of statistical software if they are to keep abreast of the explosive growth of knowledge in the rapidly growing area. This is essential for anyone intending to specialize in applied economics, as statistical software is the only interface between data and their meaningful analysis (especially if the data collection is done at a substantially sophisticated level). Therefore the students of economics need to be equipped with skills and tools based on statistical software. This will not only enhance their employability but also prepare them for future challenges. This course is basically tailored to meet this current lacuna in the research in applied economics.

Module-1: Introduction - Getting Started - Entering Data in the Data Viewer - Defining Variables - Recoding Variables - Computing new Variables - Data Analysis with Statistical Software - Generating Frequency Table, Bar Chart, Pie Chart, Histogram, Arithmetic Mean, Median, Standard Deviation and Range, Contingency Table, Chi-square, and Cramer's V, Pearson's *r*, and Spearman's rho, Scatter Diagrams - Saving, Retrieving Data - Printing Output.

Module-2: Matrix and Determinants Operations - Computing Inverse Matrix, Input-Output Analysis - Construction of Different Tables - Transaction Matrix, Technical Coefficient Matrix, Computation of Values on the Basis of Problems.

Module-3: Computing, Discounting and Calculation of Present Value - Linear Programming - Procedure used in Formulating and Solving Linear Programming Problems- Graphical and Simplex Methods, Profit Maximization and Cost Minimization.

Module-4: Construction of Frequency - Generating Graphs - Histogram, Pie Charts, Bar - Graphs, Calculation of Probability, Calculation of Central Tendencies and Measures of Dispersion.

Module-5: Estimation Correlation Coefficient - Zero Correlation Matrix - Partial Correlation - Estimation of Simple Regression - Ordinary Least Squares - Estimation of Multiple Regression.

Module-6: Test of Statistical Significance - 't' Test - F Test - ANOVA Test - Chi-Square Test Construction of Index Numbers - Deflating a Series by Price Indexes - Time Series Analysis and Forecasting.

References: [Please refer to the Latest Editions]

1. Bryman Alan, *Social Research Methods*, Oxford University Press, Oxford.
2. Edward Minieka, *Statistics for Business with Computer Application*, South-Western, USA
3. Sonia Taylor, *Business Statistics*, Palgrave.

POST-GRADUATE DIPLOMA IN RESEARCH METHODOLOGY AND QUANTITATIVE TECHNIQUES FOR DATA ANALYSIS

II - SEMESTER Course No: 4 (Supportive

Course)Course Code: (II-SC: 4) PROJECT WORK

1. Project Work

- **Project Work** shall be for 30 Marks.
- Topic for the **Project Work** can be selected by the Students or suggested by the Faculty at the beginning of the First Semester.
- The Project Work will have to be submitted by the Students to the Department before the end of the II- Semester [i.e., on or before the last working day of the Semester].

Component-1 (C1) : Periodic Progress and Reports [5 Marks] Component-2 (C2) : Results of the Work and Draft & Final Report [5 Marks] Component-3: (C3) : Final Viva Voce and Evaluatio 20 Marks]

2. Viva-Voce Examination

1. Viva-Voce shall be conducted on the Project Work submitted by the students in the Second Semester.
2. Viva-Voce Examination shall be conducted in Department of Studies in Economics & Cooperationwithin a week or two after the completion of the Second semester examination.
3. Viva-Voce Committee shall comprise of: (i) The Chairperson, (ii) Concerned Supervisor of the Project,and (iii) Three other faculty members from the Department.
4. One External Examiner from other universities within Karnataka [as decided by the DepartmentCouncil] shall be invited for conducting of Viva-Voce Examination.
5. Viva-Voce Examination shall be open to all the students of the concerned batch.
6. Marks for the Viva-Voce Exam shall be the average of marks given by all the examiners.
7. Consolidated Marks List [consisting of the marks given by each examiner] shall be sent to the Universitypreferably on the same day or immediate next working day.