SAVITRIBAI PHULE PUNE UNIVERSITY

DEPARTMENT OF ECONOMICS

Post Graduate Diploma in Data Analytics in Economics

(2019-2020)

Data is the foundation of the Digital Age. The ability to analyze data is a powerful skill that helps you make better decisions. Learning to organize, analyze and interpret these new and vast sources of information is necessary in every sphere of life such as academic and corporate research, media, and business and so on. We will learn the basics of statistical inference in order to understand and compute p-values and confidence intervals, all while analyzing data with various statistical packages. We provide programming examples in a way that will help make the connection between concepts and implementation. Problem sets requiring programming will be used to test understanding and ability to implement basic data analyses. We will use visualization techniques to explore new data sets and determine the most appropriate approach. We will describe robust statistical techniques as alternatives when data do not fit assumptions required by the standard approaches. By using various scripts used under different statistical packages to analyze data, you will learn the basics of conducting reproducible research.

With the recognition that very requirement, the Department of Economics, Savitribai Phule Pune University, Pune, introduces well structured one-year Post Graduate Diploma Programme in Data Analytics from 2019-20. A course on Data Analytics blends research insights using Research Methodology, Statistics and Econometrics which also includes handling of statistical packages. The course is designed for non-majors and introduces graduates to the subject matter. This four course Post Graduate Diploma in Data Analytics in Economics pursues science of data handling in social science in general and economics in particular. This course will help Students, Academicians, Professionals and Research Scholars in learning the skills of Statistics and Econometrics and create employment opportunities across diverse sectors for themselves.

Course Structure-

Semester-I

Course Title	Credits	Internal Marks	External Marks	Total
Research Methodology	4 credits	50	50	100
Statistics	4 credits	50	50	100

Semester -II

Course Title	Credits	Internal Marks	External Marks	Total
Econometrics	4 credits	50	50	100
Statistical Applications	4 credits	50	50	100
Total Credit/Marks	16 credits	200 marks	200 marks	400 Marks

Classes will be held at: Department of Economics, Ambedkar Bhavan, SPPU, Ganeshkhind Road, Pune-07

Commencement of the course: Proposed from Academic Year 2019-20

Eligibility: Graduate from any discipline (Minimum Grade: Second Class)

Admission Process: Through the Department Entrance Examination

Fees structure: Rs. 20,000 – Rs 25,000

Intake of the programme: 40

Duration of the course: 1 year

Teaching Methodology: Workshop based and computer oriented teaching

Course Benefit: Job oriented in Academic and Non-Academic Sectors

Tentative course structure is as follows:

Course –I Research Methodology

Topic –I: Meaning of Research

Topic-II: Research Design

Topic-III: Research Methods and Techniques

Topic-IV: Analysis of Data

Topic-V: Research Report Writing

Course-II Statistics

Topic –I: Basics of Statistics

Topic-II: Measures of Central Tendency and Dispersion

Topic-III: Probability and Probability Distribution

Topic-IV: Time Series Analysis

Topic-V: Correlation and Regression Analysis

Topic-VI: Statistical Inference and Testing of Hypothesis

Course- III Econometrics

Topic –I: Simple Regression Analysis

Topic-II: Multiple Regression Analysis

Topic-III: Further Techniques and Applications in Regression Analysis

Topic-IV: Problems in Regression Analysis

Topic-V: Simultaneous-Equations Methods

Course-IV Statistical Applications

Topic –I: Introduction to Sources of Data

Topic-II: Data Handling

Topic-III: Processing and Analyzing Data

Topic-IV: Interpretation

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Detailed Syllabus
Research Methodology

Topic I Meaning of Research
1. Meaning of research in Economics.
2. Types of research (descriptive vs. analytical, fundamental vs applied, qualitative vs quantitative, conceptual vs empirical, empirical vs simulation based, conclusion oriented vs decision-oriented, historical vs a-historical.)
3. Importance and utility of Social Science research, Limitations of and difficulties in Social Science research.

Topic II Research Design
1. Stages involved in designing research -Conceptualizing the research topic.
2. Identifying and formulating the objectives.
3. Understanding the role played by methodology.

Topic III Research Methods and Techniques
1. Research methods and techniques- differences among them, the logical framework of investigation, the nature of problem and appropriate methodology.
2. Macro-level vs. Micro level research.
3. Data Collection, Sources of Data,
4. Primary Data, Surveys, Interviews, Questionnaires, personal interviews, group interviews, small group studies, Schedule, Observation, participant or nonparticipant observation.
5. Secondary data - Collection of Secondary data
6. Case studies.
7. Experimental Method in Social Sciences.
8. Sampling Technique - Types of Samples, Size of Samples

Topic IV Analysis of Data
1. Examination of the collected data - (primary or secondary)
2. Classification and Tabulation, Bi-variate presentation.
3. Graphs and Diagrams
4. Measures of Central Tendencies. Dispersion, Correlation
5. Hypothesis Testing - Definition and Formulation

Topic V Research Report Writing

1. Stages of report writing **-** survey of literature, development of working hypotheses, preparation of research design, collection of information, processing of collected information, hypothesis testing, interpretation and generalization,
2. Report writing, references and bibliography.
3. Presentation - Power Point

Recommended Books

1. Guthrie Gerard (2010): Basic Research Methods: An Entry to Social Science Research, sage Publications, New Dehli.
2. Kothari C.R.(2004) : Research Methodology: Methods and Technique, New Age International Publishers.
3. Kumar Ranjit (2014): Research Methodology: A Step By Step Guide for Beginners, Sage Publications, New Dehli.
4. Krishnaswamy K N. and M. Ranganathan (2005): Methodology of Research in Social Sciences, Himalaya Publishing House.

Statistics

Topic I Basics of Statistics

1. Collection, Organization and Presentation of Data,
2. Frequency distribution.

Topic II Measures of Central Tendency and Dispersion
1. Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Quartiles,
2. Standard Deviation, Variance, Covariance,
3. Measures of Skewness and Kurtosis - Moments of Distribution.

Topic III Probability and Probability Distribution
1. Random Variable, and Mathematical Expectation,
2. Theoretical Distributions (Binomial, Normal, and Poisson)

Topic IV Time Series Analysis
1. Fitting Trend Curves – Linear trend
2. Exponential Trend

Topic V Correlation and Regression Analysis
1. Concept, Scatter Diagram,
2. Rank Correlation and Spearman's Rank Correlation Method
3. Regression Equations & Problems

Topic VI Statistical Inference and Testing of Hypothesis
1. Sampling, Sampling distribution for the Mean, Central Limit Theorem, Point and Interval Estimation
2. Confidence Intervals and Critical Region
3. Testing Hypothesis, Level of Significance and Level of Confidence, Tests of Significance - Type I and II errors
4. F and t-test
5. Chi-Square Test
6. Analysis of Variance – One-way and Two-way.

Recommended Books:
1. Comprehensive Statistical Methods - Arora, P.N.; Arora, Sumeet; Arora,
2. Statistical Methods – S. P. Gupta
3. Fundamental of Applied Statistics – S. C. Gupta
4. Schaum's Outline on Statistics. Murray R. Spiegel & Larry J. Stephens.

Econometrics

Topic I Simple Regression Analysis

1. The Two-Variable Linear Model
2. The Ordinary Least-Squares Method and its Properties
3. Test of Significance of Parameter Estimates
4. Test of Goodness of Fit and Correlation.

Topic II Multiple Regression Analysis

1. The Three-Variable Linear Model,
2. Tests of Significance of Parameter Estimates
3. The Coefficient of Multiple Determination
4. Test of the Overall Significance of the Regression
5. Partial-Correlation Coefficients

Topic III Further Techniques and Applications in Regression Analysis

1. Functional Forms
2. Dummy Variables.

Topic IV Problems in Regression Analysis

1. Multicollinearity
2. Heteroscedasticity
3. Autocorrelation.

Topic V Simultaneous-Equations Methods

1. Simultaneous-Equations Models
2. Identification & Estimation.

Recommended Books

1. Basic Econometrics – Damodar Gujarati
2. Introductory Econometrics: A Modern Approach - Jeffrey M. Wooldridge

Statistical Applications

Topic I Introduction to Sources of Data

1. Sources of Secondary Data

Topic II Data Handling

1. Descriptive Statistics using Excel
2. R
3. STATA
4. SPSS

Topic III Processing and Analyzing Data

1. Data cleaning

2. Data Analysis using Softwares

Topic IV Interpretation

1. Interpretation of Statistical Results

Recommended Books

1. Principles of Econometrics: An Introduction (Using R) - Neeraj R. Hatekar