

**PONDICHERRY UNIVERSITY
DEPARTMENT OF STATISTICS**

**POST GRADUATE DIPLOMA IN STATISTICAL
AND RESEARCH METHODS
(SEMESTER PATTERN)**

Effective from 2012-2013 (onwards)



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POST GRADUATE DIPLOMA IN STATISTICAL AND RESEARCH METHODS
(SEMESTER PATTERN)

REGULATION & SYLLABUS

The syllabus shall be effective from the academic year 2012-2013 onwards.

AIM OF THE COURSE:

The P.G. Diploma in Statistical and Research Methods aims to train the students both in the theoretical development and in the real life applications of modern statistical methodology. It will provide a platform for getting exposed to real life data and their statistical analysis.

ELIGIBILITY FOR ADMISSION:

Candidates for admission to the above P.G. Diploma shall be required to have U.G./P.G. degree of Pondicherry University or any other University equivalent thereto with a minimum of 45% of marks in the qualifying examination. For SC/ST/PH a mere pass in the qualifying examination will be sufficient. Candidates studying in the fourth year/ fifth year of the Five year integrated programme are also eligible.

DURATION OF THE COURSE:

The duration of the P.G. Diploma course shall be one academic year of two semesters.

MEDIUM OF INSTRUCTION:

The medium of instruction is English.

ATTENDANCE:

A candidate shall be permitted to appear for the examination in a subject of study only if He/She secures not less than 70% of attendance in the subject concerned.

SCHEME OF EXAMINATION:

All the theory and practical examinations will be of three hours duration. The maximum marks for each subject shall be 100. The weightage of marks for internal assessment and end semester examinations shall be 20 and 80 respectively. Passing minimum for theory and practical examinations should be 40 (internal assessment and end semester marks put together). A candidate who does not pass the examination in any subject(s) shall be permitted to appear in such failed subject(s) in the subsequent semester examinations.

The maximum duration for passing the entire course is two years.

The 20 marks of internal assessment component shall consist of the following:

(a)	Written test (2 class tests)	= 15 marks
b)	Written assignments	= 5 marks
	TOTAL	= 20 marks

CLASSIFICATION OF SUCCESSFUL CANDIDATE:

1. Candidates who pass all the examinations in the first appearance and secure an aggregate of 75% or above of the total marks in the University examinations shall be declared to have passed the examination for the diploma with Distinction.
2. Candidates who pass all the examinations and secure an aggregate of 60% or above but less than 75% of the total marks in the University examinations shall be declared to have passed the examination for the diploma in First Class.
3. Candidates who pass all the examinations and secure an aggregate of 50% or above but less than 60% of the total marks in the University examinations shall be declared to have passed the examination for the diploma in Second Class.
4. Candidates who pass all the examinations and secure an aggregate of 40% or above but less than 50% of the total marks in the University examinations shall be declared to have passed the examination for the diploma in Third Class.

REVISION OF REGULATIONS AND CURRICULUM:

The University may from time to time revise, amend and change the Regulations and Curriculum, if found necessary.

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Paper Code	Subjects	Credits	Internal Marks	End Semester
I Semester				
PGDS611	RESEARCH METHODOLOGY	2	20	80
PGDS612	BASIC STATISTICS	3	20	80
PGDS613	PROBABILITY AND DISTRIBUTIONS	3	20	80
PGDS614	PRACTICAL-I	3	20	80
II Semester				
PGDS621	STATISTICAL INFERENCE	3	20	80
PGDS622	APPLIED STATISTICS	3	20	80
PGDS623	PRACTICAL-II	3	20	80

SEMESTER I
PGDS611 – RESEARCH METHODOLOGY

UNIT 1

Meaning of Research – Objectives of Research – Approach to Research – Significance of Research – Types of Research – Research in Social Sciences – Facts, Theories and Concepts in Social Science Research – Research Design – features of a Good research Design

UNIT 2

Research Problem – Identifying the research Problem – Formulation of Research problem – concept of Hypothesis – Role and Formulation of Hypothesis – Scientific Methods of Research – Nature of Scientific research – Stages of Scientific Method

UNIT 3

Logic and scientific Method – Deductive and Inductive Methods – The Case Study Method – Merits and Demerits of Case Study Methods – Survey Methods - Merits and Demerits of Survey Methods – Types of survey – Selecting the Survey Method – Sample surveys – Different Types – Merits and Demerits

UNIT 4

Schedule and Questionnaire – Principle underlying the Construction of Questionnaire – measurement and scaling Techniques – Processing and Analysis of Data

UNIT 5

Interpretation and report writing – Steps – Bibliography – Qualities of a good Research Report

Books for Study:

1. C.R. Kothari, Research Methodology, Wiley Eastern Ltd., New Delhi, 2002.
2. W.G. Cochran, Sampling Techniques, John Wiley and Sons, New York, 1963.
3. W.J. Goode and P.K. Hatt, Methods in Social Science Research, McGraw Hill, New York, 1952.
4. T.S. Wilkson and P.L.Bhandarkar, Methodology and Techniques of Social Research, Himalaya Publishing House, Bombay, 1979.
5. Ram Ahuja (2001): Research Methods, Rawat Publications, New Delhi

SEMESTER I
PGDS612 - BASIC STATISTICS

UNIT 1

Definition of Statistics – Scope and limitations of Statistics – Primary and Secondary data and its sources - preparation of a questionnaire - Collection and classification of data – Diagrammatic representation of data – Bar chart and Pie chart

UNIT 2

Construction of Frequency distribution – Graphical representation of data – Histogram, frequency curves and ogives - Measures of central tendency: Mean, median and mode and their properties

UNIT 3

Measures of dispersion: Range, Quartile deviation, Mean deviation, Standard deviation and their properties – Coefficient of variation – Skewness and Kurtosis – Pearson's and Bowley's coefficients of skewness

UNIT 4

Simple correlation – Karl Pearson's coefficient of correlation – Rank correlation – Regression – lines of regression – Properties of regression coefficients

UNIT 5

Curve fitting – Principle of least squares – Fitting of Straight line and Second degree models - Measures of association

Books for Study:

1. Agarwal.B.L(1996): Basic statistics , 3/e, New Age International (P) Ltd.,.
2. Goon A.M, Gupta M.K., Das Gupta B. (1991): Fundamentals of Statistics, Vol. I, World Press, Calcutta.
3. Hooda.R.P.(2003) : Statistics for Business and Economics , 3/e, Mac Millan .
4. Medhi.J. (1992) : Statistical Methods an Introductory Text , Wiley Eastern Ltd.,.

Books for Reference:

1. Spiegel M R (1989): Schaum's Outline of Theory and Problems in Statistics, Schaum's Outline Series.
2. Ken Black (2004): Business Statistics for Contemporary Decision Making, 4/e, John Wiley and Sons

SEMESTER I
PGDS613 - PROBABILITY AND DISTRIBUTIONS

UNIT 1

Introduction to probability theory – Random experiments - Events - Sample space – Classical and Axiomatic approach to probability – Addition theorem - Conditional Probability – Independence of events – Multiplication theorem – Bayes theorem - Simple problems

UNIT 2

Random variables – Discrete and Continuous Random Variables – Probability Mass function and Probability Density function - Mathematical Expectation of a random variable - properties

UNIT 3

Discrete Distributions – Bernoulli, Binomial, Poisson, Geometric distributions and their characteristic properties - Simple problems

UNIT 4

Continuous distributions - Uniform, Normal, Exponential distributions and their characteristic properties - Simple problems

UNIT 5

Definition of sampling distributions and standard error - t, F and chi-square distributions - their uses and properties (Proofs not required)

Books for Study:

1. Gupta, S.C. and Kapoor, V.K. (2000): Fundamentals of Mathematical Statistics, 10/e, Sultan Chand and sons.
2. Hogg R. V. and Craig A. T. (1998); Introduction to Mathematical Statistics, 4/e, Academic press.
3. Mood A.M., Graybill F.A and Boes D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.

Books for Reference:

1. Bhat B.R, Srivenkataramana T and Rao Madhava K.S.(1996): Statistics: A Beginner's Text, Vol. II, New Age International(P) Ltd.
2. Goon A.M, Gupta M.K., Das Gupta B. (1980): An Outline of Statistical Theory, Vol. I, 6th revised edition, World Press, Calcutta.

SEMESTER I
PGDS614 – PRACTICAL I

1. Construction of Simple and Multiple Bar Diagrams
2. Construction of percentage Bar diagram and Pie Diagram
3. Preparation of Univariate Frequency and Percentage Tables (Discrete and Continuous cases)
4. Preparation of Bivariate Frequency Tables for Discrete variables
5. Computation of discrete statistics namely Mean, Median and mode
6. Computation of Mean deviation, standard deviation and coefficient of variation
7. Computation of Karl Perason's and Bowley's coefficient of Skewness
8. Computation of Karl – Pearson's Coefficient of Correlation
9. Computation of Spearman's Rank Correlation Coefficient
10. Fitting of regression lines
11. Fitting of straight line by the method of least squares
12. Fitting of a Parabola by the method of least squares

SEMESTER II
PGDS621 – STATISTICAL INFERENCE

(Description of the methodology and their application alone is to be emphasized)

UNIT 1

Overview of Statistical inference – Population and random sample - Point and interval estimation – Estimators and their standard errors – Criteria for Good estimator.

UNIT 2

Statistical Hypothesis testing – Simple and composite hypothesis, Null and Alternative Hypothesis – Types of errors – Critical region – Level of significance – Power of a test – Most powerful test – simple problems for calculating probability of Type I and Type II errors and power of the test

UNIT 3

Tests of significance (Large samples): Test for single mean and proportion, Test for equality of means and proportions (two populations) - Chi-square test for independence of attributes

UNIT 4

Test of significance (small samples): Test for single mean, Test for equality of means and variances (two populations) – Paired t-test

UNIT 5

Non-parametric methods: Sign test – Wilcoxon Signed rank test - Mann Whitney U test - Median test – Test for randomness (Run test) – Kruskal Wallis test – Friedman test

Books For Study:

1. Mood A M, Graybill F A and Boes D C(1974): Introduction to Theory of Statistics, McGraw Hill Publishing Co., New York
2. Goon A.M, Gupta M.K., Das Gupta B. (1980): An Outline of Statistical Theory, Vol. 2, 6th revised edition, World Press, Calcutta.
3. Hogg R.V. and Tanis E.A.(2001) : Probability and Statistical Inference, Pearson Education Asia.
4. Ken Black (2004): Business Statistics for Contemporary Decision Making, 4/e, John Wiley and Sons

Books for Reference:

1. Freund J.E. (2000): Mathematical Statistics, Prentice Hall of India.
2. Mukhopadhyay, P.(2006); Mathematical Statistics, Books and Allies(P) ltd, Kolkata
3. David R Anderson, Dennis J Sweeney and Thomas A Williams(2002): Statistics for Business and Economics, 8/e, Thomson

SEMESTER II
PGDS622 – APPLIED STATISTICS

UNIT 1

Census and sample surveys – Advantages and disadvantages – Principal steps in a sample survey – Sampling and non-sampling errors - Large scale sample surveys - Sources of Non sampling errors and methods of controlling them - NSSO and CSO and their functions.

UNIT 2

Probability Sampling Methods: Simple Random Sampling with and without replacement techniques - Methodology, comparison, Merits - Stratified Random Sampling – Concept of Proportional and Optimal allocations - Systematic Sampling - Cluster sampling - Two stage and Multi stage sampling methods – Non-probability sampling methods: Quota Sampling – Purposive Sampling

UNIT 3

Time series: Components of a time series – Additive and Multiplicative models – Decomposition of the components of a time series: Evaluation of trend by least square method and moving average methods - Seasonal indices – Method of Simple average - Ratio to moving average – Ratio to trend method

UNIT 4

Index numbers: Definition and uses – Main steps in the construction of index numbers – Weighted Index Numbers: Laspeyre's, Paasche's, Fisher's, Marshall – Edgeworth index numbers - Time and Factor Reversal Test - Fixed and Chain base index numbers – Construction and uses of cost of living index numbers.

UNIT 5

Basic Principles of Experimentation: Replication, Randomization and Local control - Analysis of variance: One way and Two way classification
Vital Statistics: Measures of mortality – crude and specific rates – infant mortality rate – direct and indirect standardization of death rates

Books for Study:

1. Goon A.M, Gupta M.K., Das Gupta B. (1991): Fundamentals of Statistics, Vol. II, World Press, Calcutta.
2. Kapoor V.K. and Gupta S.C. (1978): Fundamentals of Applied Statistics, Sultan Chand and Sons.

Books for Reference :

1. Croxton F.E, Cowden D.J and Kelin S (1973): Applied General Statistics, Prentice Hall of India.
2. Mukhopadhyay P. (1999): Applied Statistics, New Central Book Agency Pvt. Ltd., Calcutta.

SEMESTER II
PGDS623 – PRACTICAL II

1. Test for Single and Difference of Means for large samples
2. Test for Single and Difference of Proportions
3. Testing the significance of single mean and equality of means of two population (small samples)
4. Test for significance of difference between two population Means for paired samples using t- Test
5. Testing the significance of Correlation coefficient
6. Testing the equality of two population variances for small samples using F-test
7. Test the Goodness of Fit and testing the independence of attributes
8. Non-parametric methods: Sign test, Median Test, Run test, Wilcoxon Signed rank test and Mann Whitney U test.
9. Analysis of Variance : One way classification
10. Estimation of trend by the method of least squares and moving average
11. Estimation of Seasonal variations using Simple averages and Ratio to trend methods
12. Computations of Weighted index numbers using Laspeyer, Pasche's, Fisher and Marshall-Edge worth methods
13. Computation of Cost of Living Index Number