

**GURU KASHI UNIVERSITY**  
**University College of Agriculture (Code:05)**  
**Ph.D Fruit Science (Code: 584)**

**Research Methodology (180101)**

**Credit: 4**

**L T P**  
**4 0 0**

**1) Research**

Objectives of Research, Research Types, Research Methodology, Research Process – Flow chart, description of various steps, Selection of research problem.

**2) Research Design**

Meaning, Objectives and Strategies of research, different research designs, important experimental designs, Completely randomized, Randomized block, Latin Square, Factorial Experimental Design.

**3) Methods of Data Collection**

Types of data collection and classification, Observation method, Interview Method, Collection of data through Questionnaires, Schedules.

**4) Processing and Analysis of Data:**

Editing, Coding, Classification of data

Statistical measures and their significance: Central tendencies, Variation, Skewness, Kurtosis. Correlation and Regression, Multiple Regression, Time Series Analysis,

Parametric tests (t, z and F), Chi Square test.

Analysis of Variance, One - way ANOVA

Factor Analysis, Centroid Method .

Computer simulations using MATLAB/SPSS

**5) Probability Distributions**

Binomial, Poisson, Exponential, Normal distributions, Frequency distribution, Cumulative Frequency distribution, Relative Frequency distribution.

**6) Sampling Methods:**

Different methods of Sampling : Probability Sampling methods, Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling.

Non Probability Sampling methods, Sample size.

**7) Testing of Hypotheses:**

Testing of Hypotheses concerning Mean(s), Testing of Hypotheses concerning Proportion (s),

Testing of Hypotheses concerning Variance(s)

**8) Report Writing and Presentation:**

Types of reports, Report Format – Cover page, Introductory page, Text, Bibliography, Appendices, Typing instructions, Oral Presentation.

**References:**

1. Montgomery, Douglas C. (2007), 'Design and Analysis of Experiments', (Wiley India)

2. Montgomery, Douglas C. & Runger, George C., 'Applied Statistics & Probability for Engineers' (Wiley India)

3. Kothari C.K. (2004), 'Research Methodology- Methods and Techniques' (New Age International, New Delhi)

4. Krishnaswamy, K.N., Sivakumar, Appa Iyer and Mathiranjani M., 'Management

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Research Methodology; Integration of Principles, Methods and Techniques' (Pearson Education, New Delhi)

5. Chawla ,Deepak ,Sondhi ,Neena, 'Research Methodology Concepts and Cases', Vikas Publishing House Pvt Ltd ,New Delhi.

6.Panneerselvam, R , 'Research Methodology', PHI, New Delhi.

7. Cooper, D.R., Schindler,P.S., 'Business Research Methods,' Tata McGraw Hill

8.Gupta S P,' Statistical Methods', Sultan Chand & Sons, Delhi

9. Ronald E Walpole, 'Probability and Statistics for Engineers and Scientists' (International Edition) , Pearson Education.

10. Pulak Chakravarty: "Quantitative Techniques for Management and Economics", Himalaya Publishing House.

11. P.C.Tripathi, "A Text Book of Research Methodology in Social Sciences, Sultan Chand & Sons".

12. Bhattacharyya D.K., 'Research Methods', Sage Publications.

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**Computer Applications in Research (180102)**

**Credit: 2**

**L T P**  
**1 0 2**

**Common for all branches except Hindi, Punjabi, English, History and Religious Study.**

**Unit 1**

Generating Charts/Graphs in Microsoft Excel, Power Point Presentation, Web search, Use of Internet and www. Using search like Google etc.

**Unit 2:**

SPSS concepts and its use for Statistical Analysis.

**Unit 3:**

MatLab and its use for Statistical Analysis.

**Unit 4:**

Introduction to the use of LaTeX, Mendeley, Anti-Plagiarism Softwares .

**References:-**

- 1) Office 2007 in Simple Steps, Kogent Solutions, (Wiley Publishers).
- 2) MS-Office 2007 Training Guide, S. Jain (BPB Publications).
- 3) Bansal , R. K. and others 'MATLAB and its applications in Engg. Second Edition, Pearson Education, Delhi.
- 4) Sabine handan & Brian S. Everitt, "A Handbook of Statistical Analysis using SPSS", Chapman & Hall / CRC Publication, USA.

**GURU KASHI UNIVERSITY**  
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**Ph.D Fruit Science (Code: 584)**

**Advances in Breeding Fruit Crops (584101)**

**Credit: 3**

**L T P**  
**3 0 0**

Evolutionary mechanisms, adaptation and domestication. Genetic resources, cytogenetic, cytomorphology, chemotaxonomy, genetics of important traits and their inheritance pattern. Variations and natural selection, spontaneous mutations, incompatibility systems in fruits. Recent advances in crop improvement through introduction and selection, chimeras, apomixes, clonal selections, intergeneric, interspecific and intervarietal hybridization, mutation and polyploidy breeding, resistance breeding to biotic and abiotic stresses. Breeding for improving quality. Molecular and transgenic approaches in improvement of selected fruit crops: Mango, banana, papaya, grapes, citrus fruits, guava, sports, pineapple, avocado, apple, pear, plums, peaches, apricot, cherries and strawberry.

**Advances in Production of Fruit Crops (584102)**

**Credit: 3**

**L T P**  
**3 0 0**

National and international scenario. Advances in propagation, root stock problems and their influence, planting systems. High density planting and crop modeling. Precision farming. Aspects of crop regulation. Influence of stress factors, strategies to overcome stress effects. Integrated water and nutrient management. Total quality management of mango, banana, papaya, grapes, citrus, guavas, sapota, pomegranate, amla, pineapple avocado, jack fruit, fig, apple, pear, plum, strawberry, peach, apricot, cherries and nut crops.

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**Advances in Growth Regulation of Fruit Crops (584103)**

**Credit: 3**

**L T P**  
**3 0 0**

Ecophysiological influences on growth and development like flowering, fruit set , crop load and assimilate partitioning and distribution. Root and canopy regulation. Biosynthesis, metabolic and morphogenetic effects of different plant growth promoters and growth retardants. Absorption, translocation and degradation of phyto-hormones, internal and external factors influencing hormonal sunthesis, biochemical action, of propagation, embryogenesis, seed and bud dormancy. Fruit bud initiation, flowering, off season production. Flower drop and thinning, fruit set and development, fruit drop, parthenocarpy, fruit maturity, ripening and storage. Molecular approaches in crop growth regulation.

**Advances in Nutrition of Fruit Crops (584104)**

**Credit: 3**

**L T P**  
**3 0 0**

Historical background. Organic and inorganic sources . Nutrition and plant health- role of macro, secondary and micro nutrients. Nutrient status of different types of soils. Mineral uptake and translocation- theorisis and manchanisms. Nutritional problems of saline, sodic and water logged soils and their solutions. Inter-relationships of elements of fruit plants. Deficiency and toxic nutrient symptoms. Nutritional disorders in fruits. Fertilzer needs, scheduling, foliar feeding and fertigaition. Bio fertilizers- role and classification. Integrated nutrient management in fruit crops.