GURU KASHI UNIVERSITY

Doctor of Philosophy In Plant Pathology

Session: 2025-26

Faculty of Agriculture

Program Structure									
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Total Credits**	**Int.**	**Ext.**	**Total Marks**
PPH101	Research Methodology	Core	4	0	0	4	30	70	100
PPH102	Research and Publication Ethics	Core	2	0	0	2	30	70	100
PPH104	Computer Applications in Research	Skill Based	0	0	4	2	30	70	100
PPH113	Advances in Mycology, Bacteriology, Virology and Molecular basis of Host-Parasite Interaction	core	4	0	0	4	30	70	100
Total Numbers of Credits						12	120	280	400

Course Title: Research Methodology

L	T	P	Credits
4	0	0	4

Course Code: PPH101

Total Hours: 60

Learning Outcomes

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

1. Formulate research problems by conducting comprehensive literature reviews utilizing web sources
2. Apply appropriate research design choices based on research questions and objectives.
3. Explore the integration of qualitative and quantitative data and the concept of triangulation and complementarily of data sources.
4. Utilize statistical software packages commonly used in research for importing, managing, cleaning, and analyzing data.
5. Apply different statistical techniques to summarize and analyze data effectively.

Course Content

Unit-I **15 Hours**

Introduction to Research

Meaning, Objectives, Characteristics, Significance and Types of Research.Understanding a Research Problem, Literature Review, Methods and Reporting, Selecting the Research Problem, Steps in Formulation of a Research Problem.

Unit-II **15 Hours**

Research Process and Hypothesis

Constructing Hypotheses; Conceptualizing a Research Design-Meaning and Types of Research Design.Parametric and Non-Parametric Test, Errors and Level of Significance.Completely randomized design, Random block design, Latin square design, Statistical analysis.Components of time series, Analysis of time series, Measurement of trend, Measurement of seasonal variations.

Unit-III **15 Hours**

Sampling Design and Data Analysis

Sampling Techniques-Probability and Non-Probability, Qualities of a good

Sample, Sample Size and its Determination.

Introduction to Qualitative, Quantitative and Mixed Methods, Quantitative Methods- Univariate, Bivariate and Multivariate, Qualitative Methods- Grounded Theory and Triangulations, Mixed Methods- Convergent Parallel, Explanatory Sequential, Exploratory Sequential and Transformative.

Implementation of statistical techniques using statistical packages viz. SPSS R including evaluation of statistical parameters and data interpretation, Regression Analysis, Covariance, analysis of variance.

Unit-IV **15 Hours**

Report Writing

Types of Reports- technical and Popular Reports, Significance of Report Writing, Different Steps in Writing Report, Art of Writing Research Proposals, Research Papers, Projects Reports and Thesis; Basics of Citation and Bibliography/Reference Preparation Styles; Report Presentation: Oral and Poster Presentations of Research Reports.

Suggested Reading

1. *Gupta, S. (2010). Research Methodology and Statistical Techniques. Deep & Deep Publications (P) Limited, New Delhi.*
2. *Kothari, C.R., Garg, G. (2019). Research Methodology: Methods and Techniques. 4th Edition, New Age International (p) Limited. New Delhi.*
3. *Sahay, Vinaya and Pradumna Singh (2009). Encyclopedia of ResearchMethodology in Life Sciences. Anmol Publications. New Delhi.*
4. *Kauda J. (2012). Research Methodology: A Project Guide for University Students. Samfunds literature Publications.*
5. *Dharmapalan B. (2012). Scientific Research Methodology. Narosa Publishing*

Course Title: Research and Publication Ethics

Course Code: PPH102

L	T	P	Credits
2	0	0	2

Total Hours 30

Learning Outcomes

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

1. To have awareness about the publication ethics and publication misconducts.
2. To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact factor etc)
3. Develop hands-on skills to identify research misconduct and predatory publications.

Course Content

- **RPE 01: PHILOSOPHY AND ETHICS** **3 Hours**

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

- **RPE 02: SCIENTIFICCONDUCT** **5 Hours**

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS** **7 Hours**

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING** **4 Hours**

1. Open access publications and initiatives
2. SHERPA/ROMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU

- Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- RPE 05: PUBLICATION MISCONDUCT (4 Hrs.)

A. Group Discussions **2 Hours**

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools **2 Hours**

Use of plagiarism software like Turnitin, Urkund and other open source software tools

- **RPE 06: DATABASES AND RESEARCH METRICS (7 Hrs.)**

A. Databases **4 Hours**

1. Indexing databases
2. Citation databases: Web of Science, Scopus etc.

B. Research Metrics **3 Hours**

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g-index, i10 index, altmetrics

Suggested Readings

1. *Bird, A. (2006). Philosophy of Science. Routledge.*
2. *MacIntyre, A. (1967) A Short History of Ethics. London.*
3. *P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865*
4. *National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition. National Academies Press.*
5. *Rensik, D. B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieved from https://www.niehs.nih.gov/resources/biothics/whatis/index.cfm*
6. Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179.https://doi.org/10.1038/489179a

IQAC

Course Title: Computer Applications in Research

Course Code: PPH104

L	T	P	Credits
0	0	4	2

Total Hours 30

Learning Outcomes

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

1. The students will become familiar with the usage of software for managing the reference.
2. To make literature reviews easily.
3. To make reference management by using open software.

Unit 1 **06Hours**

MS Word Essentials-Create a document with styled headings and subheadings, Add headers, footers, and page numbers, Adjust page layout settings (margins, orientation, page size).

Table Creation and Management-Insert, format, and style tables, Adjust cell size, merge/split cells, and sort/filter data.

Working with Graphics-Insert and format images, shapes, SmartArt, and text boxes, Apply text wrapping around objects.

Unit 2 **08Hours**

Basics of PowerPoint- Slide layouts, themes, and templates, Adding multimedia: Images, audio, and videos.

Advanced Techniques- Animations and transitions for visual effects, Slide master for consistent formatting, Interactive elements: Hyperlinks and action buttons.

Design Best Practices- Typography, color schemes, and visual hierarchy, Tips for engaging presentations.

Unit 3 **08Hours**

Introduction to Mendeley- Installing and setting up Mendeley Desktop and Web, Importing references from various sources.

Organizing References- Creating folders and tagging references, Annotating and highlighting PDFs.

Citations and Bibliography- Integrating Mendeley with MS Word, using citation styles (APA, MLA, Chicago), Generating a bibliography automatically.

Unit 4 **08Hours**

AI Tools for Productivity- Text-Based AI Tools (e.g., ChatGPT) Writing assistance, summarization, and brainstorming, Grammar and style checking, Image and Design Tools, Speech and Audio Tools

Suggested Readings

1) *Office 2007 in Simple Steps, Kogent Solutions, (Wiley Publishers).*
2) *MS-Office 2007 Training Guide, S. Jain (BPB Publications).*
3) *Computer Fundamentals by P.K. Sinha (BPB Publications).*

4) https://www.mendeley.com/reference-management/reference-manager
5) https://chat.openai.com
6) https://edu.google.com/workspace-for-education/classroom/

Course Title:Advances in Mycology, Bacteriology, Virology and Molecular basis of Host-Parasite Interaction
Course Code: PPH113

L	T	P	Credits
4	0	0	4

Total Hours 60

Learning Outcomes

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

1 Familiarize with induction of defense responses- pathogenesis related proteins, HR, reactive oxygen species, phytoalexins and systemic acquired resistance, programmed cell death, viral induced gene silencing.
2 Understand the mechanism of disease development and defence.
3 Learn molecular methods for identification and characterization of pathogens.
4 Identify and preserve bacterial and fungal cultures, understand the recognition system and signal transduction of pathogens.

Theory

UNIT I **17 Hours**

General introduction, historical development and advances in mycology. Recent taxonomic criteria, morphological criteria for classification.Serological, Chemical (chemotaxonomy), Molecular and Numerical (Computer based assessment) taxonomy. Interaction between groups: Phylogeny. Micro conidiation, conidiogenesis and sporulating structures of fungi imperfecti. Morphology and reproduction of representative plant pathogenic genera from different groups of fungi. Sexual reproduction in different groups of fungi. Population biology, pathogenic variability/vegetative compatibility. Heterokaryosis and parasexual cycle.Sex hormones in fungi.Mechanism of nuclear inheritance.Mechanism of extra-nuclear inheritance.Biodegradation.

UNIT II **16 Hours**

Nomenclature, characteristics and classification of bacteria, Ultrastructures and biology of bacteria. Fastidious bacteria, mechanism of soft rot (Erwinia spp.) development, mechanism of crown gall formation (Agrobacterium tumefaciens), Mechanism of wilt (Ralstoniasolanacearum) development. Role of enzyme, toxin, expolysaccharide, polypeptide signals in disease development, epidemiology in relation to bacterial plant pathogens. Host-bacterial pathogen interaction, quorum-

sensing phenomenon, Type III secretion system, colonization ability of bacteria, bacterial EPS and their role as disease determinant. Plasmid biology, molecular variability among phytopathogenicprocarya and possible host defense mechanism(s), genetic engineering for management of bacterial plant pathogens-gene silencing, RNAi technology.

UNIT III **14 Hours**

Introduction to Advanced Virology Mechanism of virus transmission by vectors, virus-vector relationship, virus replication, assembly and architecture, ultrastructural changes due to virus infection, variation, mutation and virus strains. Production PAb and hybridoma, nucleo-based diagnostic technique, methods of immunodiagnosis, hybridoma technology and use of monoclonal antibodies in identification of viruses and their strains, Polymerase Chain Reaction, Rolling Circle replication. Genome organization, gene expression in Gemini viruses, mechanism of replication, transcription and translational strategies of pararetroviruses and gemini viruses. Gene expression and regulation, viral promoters, molecular mechanism of host virus interactions, virus induced gene, molecular mechanism of vector transmission, symptom expression, viroids and prions. Genetic engineering with plant viruses, viral suppressors, RNAi dynamics, resistant genes. Viruses potential as vectors, genetically engineered resistance, transgenic plants. Techniques and application of tissue culture.Origin, evolution and interrelationship with animal viruses.

UNIT IV **13 Hours**

Importance and role of biotechnological tools in Plant Pathology- Basic concepts and principles to study host pathogen relationship. Molecular basis of host-pathogen interaction- fungi, bacteria and viruses; recognition system, signal transduction. Induction of defense responses- pathogenesis related proteins, HR, reactive oxygen species, phytoalexins and systemic acquired resistance, Programmed Cell Death, Viral induced gene silencing. Molecular basis of gene-for-gene hypothesis; R-gene expression and transcription profiling, mapping and cloning of resistance genes and marker-aided selection, pyramiding of R genes.

Biotechnology and disease management; development of disease resistance plants using genetic engineering approaches, different methods of gene transfer, biosafety issues related to GM crops.

Suggested Readings:

1. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. 2007. Introductory Mycology. Fourth edition. Wiley Publishing, Inc., New Delhi. pp. 800.

2. Harshberger, J.W. 2010. A Text-Book of Mycology and Plant Pathology. Nabu Press, Charleston, South Carolina. pp. 780.

3. Hait, G. 2017. A Textbook of Mycology, 1st edition. New Central Book Agency (NCBA),Kolkata, West Bengal. pp. 774

4. Goto, M. 1990. Fundamentals of Plant Bacteriology. Academic Press, New York. pp.

952.
5. Mount, M.S. and Lacy, G.H. 1982. Phytopathogenic Prokaryotes. Vols. I Academic Press, New York. pp. 560.
6. Mondal, K.K. 2011. Plant Bacteriology. Kalyani Publishers, Ludhiana, Punjab. pp. 190.
7. Walkey, D. 2012. Applied Plant Virology, 2nd edition. Springer, Philippines. pp. 352.
8. Kolte, S.J. and Tewari, A.K. 2011. The Elements of Plant Virology: Basic Concepts and Practical Class Exercises. Kalyani Publishers, Ludhiana, Punjab. pp. 213.
9. Hull, R. 2013. Plant Virology, 5th edition. Acdemic Press. New York. pp. 1118.
10. Marshall, G. 1994. Molecular Biology in Crop Protection. Springer, Netherlands. pp. 283.
11. Nagarajan, S. 2013. Dynamics of Plant Diseases. Allied Publishers, New Delhi, India. pp. 120.
12. Mehrotra, R.S. 2011. Plant Pathology. McGraw Hill Education, New York, United States. pp. 910.