

GURU KASHI UNIVERSITY



**Doctor of Philosophy
In
Entomology**

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
PPH116	Advances in Integrated Pest Management and Insect Ecology, Insect Pest Management, Biological Control, Insect Toxicology, Insect Physiology	core	4	0	0	4	30	70	100
Total Credits						12	120	280	400

Course Title: Research Methodology

Course Code: PPH101

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. 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 complementarity 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

15Hours

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, and 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

- Gupta, S. (2010). Research Methodology and Statistical Techniques. Deep & Deep Publications (P) Limited, New Delhi.
- Kothari, C.R., Garg, G. (2019). Research Methodology: Methods and Techniques. 4th Edition, New Age International (p) Limited. New Delhi.
- Sahay, Vinaya and Pradumna Singh (2009). Encyclopedia of Research Methodology in Life Sciences. Anmol Publications. New Delhi.
- Kauda J. (2012). Research Methodology: A Project Guide for

University Students. Samfunds literature Publications.

- 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: SCIENTIFIC CONDUCT

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

• RPE03: 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**
Hours
 - A. Group Discussions (2 hrs.)**
 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 hrs.)**

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

RPE 06: DATABASES AND RESEARCH METRICS **7** **Hours**

- A. Databases (4 hrs.)**
 1. Indexing databases
 2. Citation databases: Web of Science, Scopus etc.
- B. Research Metrics (3 hrs.)**
 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

- Bird, A. (2006). Philosophy of Science. Routledge.
- MacIntyre, A. (1967) A Short History of Ethics. London.

- P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865
- 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.
- 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/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. <https://doi.org/10.1038/489179a>

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.

Course Content

Unit I

06 Hours

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 II

08 Hours

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 III

08 Hours

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 IV

08 Hours

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

- Office 2007 in Simple Steps, Kogent Solutions, (Wiley Publishers).
- MS-Office 2007 Training Guide, S. Jain (BPB Publications).
- Computer Fundamentals by P.K. Sinha (BPB Publications).
- <https://www.mendeley.com/reference-management/reference-manager>
- <https://chat.openai.com>
- <https://edu.google.com/workspace-for-education/classroom/>

Course Title: Advances in Integrated Pest Management and Insect Ecology, Insect Pest Management, Biological Control, Insect Toxicology, Insect Physiology
Course Code: PPH111

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 Study the concepts of Entomological research and integrated pest management in different crops system.
- 2 Familiarize with different abnormalities caused by insects, pathogens, nematodes, weeds and imbalanced plant nutrients and had confidence to handle plant protection problems faced by the farmers/growers.
- 3 Evaluate methods of population estimation of insect pests in various Agro-ecosystems.
- 4 Understand the major pesticides and their classification, nomenclature, dosage calculation, pest resurgence, Insecticide Resistance Management, IDM/IPM compatible Pesticides.

Course Content

UNIT I

15 Hours

History, concept and philosophy of IPM, Current status (National and International) of IPM implementation. Agricultural Pests of national importance, Major past epidemics, Survey and Surveillance and crop loss assessment; Important Weeds and their management, Agroecosystems, habitat management and conservation of natural enemies and their significance in IPM, Cultural, Mechanical and Physical Control Measures, genetic resistance / GM crops with special emphasis on cotton, rice, maize, soybean, tomato, canola etc. scouting / Economic Injury Levels /Action thresholds / Pheromone Monitoring and mass trapping of pests of rapeseed mustard, pearl millet, vegetable and fruits. Bio-pesticides / bio-agents / botanicals / Quality parameters, registration, mass production and their integrated field use against different insect pests/diseases/nematodes etc. Chemical control: Major pesticides and their classification, Pesticide Acts, Registration, Growth of pesticide industry, dosage calculation, pest resurgence, Insecticide Resistance Management, IPM compatible Pesticides. Concept of environmental Impact Quotient (EIQ), regulatory and Quarantine Measures, Quality control of IPM Inputs, forecasting of important pests in the country and Pest Risk Analysis. Base line studies for identification of crop-based problems and socio-economic benchmarks; synthesis and development of IPM modules, data recording, on-farm validation and promotion of IPM, including important case studies and impact analysis, expert Systems in IPM, On-line Monitoring, role of media

and information technology including Networking solutions; future trends in Pest management.

UNIT II

15 Hours

Database management and computer programming, simulation techniques and system analysis and modelling. Case histories of national and international programmes, their implementation, adoption and criticisms, global trade and risk of invasive pests. Advances in application of behaviour modifying chemicals, insect growth regulators, genetic engineering and other biotechnological strategies for management of insect pests. Strategies for pesticide resistance management and resurgence in insects. Scope and limitations of bio-intensive and ecological based IPM programmes. Applications of IPM to farmers' real time situations. Dynamism of IPM under changing cropping systems and climate; insect pest management under protected cultivation. Advances in pesticide application technology.

UNIT III

15 Hours

Scopes of classical biological control and augmentative biocontrol; introduction and handling of natural enemies; nutrition of entomophagous insects and their hosts, dynamics of biocontrol agents *vis-a-vis* target pest populations. Mass culturing techniques, immature stages of parasitic and predatory insects, insectary facilities and equipment's, basic standards of insectary, viable mass-production unit, designs, precautions, good insectary practices. National and international guidelines on natural enemy introduction; success stories of classical biological control, scope of fortuitous biological control due to liberalization in global trade in agriculture; international standards for testing side effects of pesticides on natural enemies; quality control parameters of Parasitoid and predators, status of commercialization and field use of Parasitoid and predators of important insect pests of crops, and beneficial insects and weeds. Colonization, techniques of release of natural enemies; recovery evaluation, conservation and augmentation of natural enemies; survivorship analysis and ecological manipulations; large-scale production of biocontrol agents, bankable project preparation. Scope of genetically engineered microbes and Parasitoid in biological control, and genetics of ideal traits in biocontrol agents for introgression and for progeny selections breeding techniques of biocontrol agents.

UNIT IV

15 Hours

Pesticides industry in India-commercial aspects; effect of insecticides on insects at population level. Insecticide resistance; detection, monitoring and management; synergism, antagonism and potentiation; ecotoxicology and

biomagnification. Botanical insecticides, synthetic pyrethroids, neonicotinoids, ecdysone, agonist, avermectins and novel group of insecticides. Pesticide residues in commodities and their decontamination; Codex Alimentarius" considerations.

UNIT V

15 Hours

Ultra structure, physiology and biochemistry of insect cuticle and moulting process. Biosynthesis of chitin, chitin-protein interactions in various cuticles, and types of sclerotization. Digestive enzymes, digestive physiology in phytophagous insects, wood boring and wool feeding insects, efficiency of digestion and absorption, role of endosymbionts in insect nutrition, nutritional effects on growth and development, physiology of excretion and osmoregulation, water conservation mechanisms. Evolution of digestive system with food habits and insect habitats. Detailed physiology of nervous system ultra structure of nerve and glial cell. Advances in physiology of neuro-endocrine system. Adaptation of insects to various ecosystem transmission of nerve impulses, neurotransmitters and modulators. Production of receptor potentials in different types of sensilla, pheromones and other semi chemicals in insect life, toxins and defense mechanisms. Endocrine system and insect hormones, physiology of insect growth and development- metamorphosis, polyphenism and diapause. Energetics of muscle contractions. Hormonal control of flight and migration.

Suggested Readings:

1. Dent, D. 1995. Integrated Pest Management. Springer, Netherlands. pp. 356.
2. Dhaliwal, G.S. and Arora, R. 2014. Integrated Pest Management. Kalyani Publisher, New Delhi. pp.283.
3. Ruberson, J.R. 1999. Handbook of Pest Management. Marcel Dekker, Inc., USA. pp. 842.
4. Schowalter, T.D, 2000. Insect Ecology. Academic Press. USA. pp.576.
5. Evans, J.W. 2005. Insect Pests and their Control. Asiatic Publication, New Delhi. pp.178.
6. Horowitz, A.R. and Ishaaya, I. 2004. Insect Pest Management: Field and Protected Crops. Springer, New Delhi. pp.344.
7. Metcalf, R.L. and Luckman, W.H. 1982. Introduction of Insect Pest Management. Wiley-Interscience, New York. pp.587.
8. Pedigo, R.L. 2002. Entomology and Pest Management. Prentice Hall, New Delhi. pp.812.
9. Coppel, H.C. and James, W.M. 1977. Biological Insect Pest Suppression. Springer Verlag, Berlin. pp.314.
10. DeBach, P. 1964. Biological Control of Insect Pests and Weeds. Chapman and Hall, London. pp.800.

11. Gautam, R.D. 2008. Biological Pest Suppression. Westville Publishing House, Delhi. pp.288.
12. Saxena, R.C.and Srivastava, R.C. 2007. Entomology at a Glance. Agrotech Publishing Academy, Jodhpur. pp.768.
13. Kerkut, G.A. and Gilbert, L.I. 1985. Comprehensive Insect Physiology, Biochemistry and Pharmacology. Pergamon Press, Oxford.pp.8200.
14. Matsumura, F. 1974. Toxicology of Insecticides. Plenum Press, USA.pp.612.
15. Patnaik, B.D. 2002. Physiology of Insects. Dominant publisher, New Delhi. pp.196.
16. Simon, J. Yu. 2014.The toxicology and Biochemistry of Insecticides, CRC Press, Boca Raton, Florida.pp.380.
17. Nation, J.L. 2002. Insect Physiology and Biochemistry. CRC Press, Boca Raton, Florida.pp.485.
18. Patnaik, B.D. 2002. Physiology of Insects. Dominant publisher, New Delhi. pp.196.
19. Wigglesworth, V.B. 1985. Insect Physiology. 8th edition, Springer, Cambridge. pp.192.