SYLLABUS

Ph.D. Course Work

(*w. e. f. academic year 2025-2026 and onwards)*

Ref : SPPU Circular No. 195/2025

PGS/1860, Date: 23/07/2025

Department of Botany

Savitribai Phule Pune University

(Formerly University of Pune)

Structure of the Ph.D. Coursework in Botany under

Faculty of Science and Technology

- Total Number of credits for M.Phil. / Ph.D. shall be 18
- The course work shall be treated as pre-requisite for M.Phil. / Ph.D. programme
- The M.Phil. / Ph.D. course work shall consist of the following components, structure and the respective credits.

Course 1

Subject	Credits	No. of class hours	Syllabus	Mode of conduction or Responsibility	Recommendation and evaluation
Research Methodology	4	60	**Research Methodology (7L)** • Meaning of Research • Objectives of Research • History of research. Indian, Egyptian, Greek ideas, methodologies and research in agriculture, chemistry, metallurgy, medical. • Types of Research: Descriptive Vs Analytical Research, Applied Vs Fundamental Research, Quantitative Vs Qualitative Research, Conceptual Vs Empirical Research	Concerned Research Centre	Subject expertise from different departments/research centers/research institutes will teach and evaluate

			• Criteria for Good Research • Significance of Research • Methods and Techniques used: Library, Field and Laboratory Research • Safety in Laboratories and in field, Ethical considerations, effective verbal and non-verbal communication **Defining Research Problem (3L)** • What is a Research Problem? • Selecting the Problem • Necessity of Defining the Research Problem • Technique involved in Defining a Research Problem **Research Hypothesis (7L)** • What is Hypothesis? • Characteristics of Hypothesis • Sources of Hypothesis • Types of Hypotheses: Simple Hypothesis, Complex Hypothesis, Directional Hypothesis, Non-directional Hypothesis, Null Hypothesis, Associative and Causal Hypothesis		

			• Functions of Hypothesis • How will Hypothesis help in Scientific Method? **Literature Review and References (7L)** • What is Literature Review? • Purpose of Literature Review • Types of Literature Review • How to write a Review Article? Format of Review Article • Difference between Review Articles and Research Papers • Various Referencing Styles - • Bibliometric analysis, Systematic Literature Survey, various softwares • Introduction to Meta-analysis and analysis softwares **Research Ethics and Intellectual Property Rights (6L)** • IPR • Patent • Copyright • Procedures for filling patent and copyright **Methods of Data Collection (6L)**		

			• Collection of Primary Data • Observation Method • Interview Method • Collection of Data through Questionnaires, Likert scale • Documentation of Data **Interpretation and Report Writing (6L)** • Meaning of Interpretation • Why Interpretation • Steps and Layout of Research Report • Mechanics of Writing a Research Abstract, Paper and Report • Oral and Poster Presentations **Role of Computer in Research (12L)** • Basics of Computer and introduction to Microsoft Office (MS Word, Excel, and PowerPoint), Internet • Tabulation and generation of graphs • Micro Imaging System/Digital Photography • Use of tools / techniques for Research		

			• Scientific Search Engines for referencing the research work • Reference Management Software like Zotero /Mendeley • Software for research paper formatting like LaTeX/MS Office • Data analysis: Mean, Mode, Median, Standard Deviation, Coefficient of Variation, T-Test, Chi-square test, ANNOVA • Data interpretation software - SPSS **Plagiarism, Impact Factor and Scientific Journals (6L)** • Software for detection of Plagiarism • Concept of Journal Citation Reports (JCR) and Journal Impact Factor (IF), • Formula for calculation of IF, • Use, significance and limitations of IF, • Concept and importance of Citations in research, • H-Index, i10-Index, • Introduction and concept of UGC CARE listed journals and Journals		

			indexed by Thomson Reuters Scientific.		

Note:

- *The contact hours will be around 60based on assignments and examinations.*
- *The examination for each module will be separately performed.*

References:

- Kothari C. R. Research Methodology (Methods and Techniques), New Age International Publishers, New Delhi
- Bill Taylor, Gautam Sinha and Taposh Ghoshal, Research Methodology, PHI Learning Private Limited, New Delhi
- Gurumani N. Research Methodology for Biological Sciences, MJP Publishers, Chennai
- Upagade Vijay and Shende Arvind, Research Methodology, S. Chand & Company Limited, New Delhi
- Suresh Chandra and Mohit Sharma, Research Methodology, Narosa Publishing House, New Delhi
- Jeff Lenburg, Guide to Research, Viva Books Private Limited, New Delhi
- R. Panneerselvam, Research Methodology, Prentice Hall of India Private Limited, New Delhi

Course 2

Subject	Credits	No. of class hours	Syllabus	Mode of conduction or Responsibility	Recommendation and evaluation
i) Writing Research Proposal for obtaining financial assistance from funding agencies	1	15	Based on the Ph.D. topic	Concerned Research Centre	Experts from concerned research centre should teach and evaluate the students.
ii) Writing of Reviews	1	15	Any topic relevant to the research area	Guide	Guide should teach and evaluate
iii) Seminars	2	30	**Seminar 1:** Review article written by the	Guide	Guide + 2 members(Internal / external) should evaluate

			candidate **Seminar 2:** Review or research article from renowned journal **Seminar 3:** Based on the project proposal written for the extramural funding		

Course 3

Subject	Credits	No. of class hours	Syllabus	Mode of conduction or Responsibility	Recommendation and evaluation
Subject specific advance level course **Subject 1**	3	45	**Subject-1: Advances in Botany I** 1. Biodiversity and Conservation 2. Bioremediation and Restoration 3. Bioprospecting 4. Ecology and Evolution 5. Plants interacting with other organisms	Research Centre	Respective research centre should teach and evaluate the students.
Subject 2	3	45	**Subject-2: Advances in Botany II** 1. Metabolic engineering and metabolomics 2. Reverse genetics and its application 3. Plant genetics and breeding		

			4. Plant signaling and behavior **5.** Medicinal plants and natural product chemistry		
Subject 3	2	30	**Advances in Botany-III** Techniques in Botany: Lab-rotation and hands on training		

Course 4

Subject	**Credits**	**No. of class hours**	**Syllabus**	**Mode of conduction or Responsibility**	**Recommendationand evaluation**
Publication ethics	2	30	**Theory:** • Philosophy and ethics • Scientific conduct • Publication ethics **Practice:** • Open access publishing • Publication misconduct • Data bases and research matrices	Centre for Publication Ethics, SPPU	Adopted publication ethics online course conducted by Centre of Publication Ethics, SPPU.

Board of Studies (Botany)
Savitribai Phule Pune University, Pune.