

Ph.D. Syllabus

BOTANY DEPARTMENT KURUKSHETRA UNIVERSITY KURUKSHETRA

Course Work for Ph.D. (Botany)

Bot.601- Research Methodology

UNIT-I

Preparation of Culture Media for Microorganisms

Preparation of basic solid Media (PDA, CDA)

Techniques for isolation and enumeration of microorganisms

Isolation and enumeration of microorganisms from soil by the serial dilution agar plating method.

Isolation of fungi from soil by Warcup and Wakesman method.

Inoculum production and mass culturing of VAM fungi.

Electron Microscopy – General Account] YK

CBS&

YK

UNIT-II

Techniques of Plant Tissue Culture

Medium preparation and types of media, Sterilization techniques for medium, glassware and explant, Inoculation techniques, Techniques for isolation and culture of protoplast

Physiology Biochemistry

Chromatography, Gel Electrophoresis: Principles and types.

MS
NLS

UNIT-III

Ecology and Ecosystems dynamics

Vegetation analysis, plant diversity indices, Methods of estimating plant biomass and productivity, Approaches for biodiversity conservation, Remote sensing and geographical information systems-basic concepts and application in Forest ecology and resource management

SJ

UNIT-IV

Statistical methods

Frequency distribution; Measures of Central tendency and dispersion, correlation and regression, ANOVA] YK

Application of Nuclear Techniques

Tracer techniques in crop improvement and sustainable agriculture, Computer Applications for data analysis and presentation. Use of basic computer softwares: MS Office and SPSS.] NS

Ph.D. Syllabus

PAPER – II

SUBJECT SPECIFIC

4 CREDITS (M.M 100)

Unit – I

CBS [Milestones in phytopathology with particular reference to India, Plant disease clinics, some aspects of applied plant pathology, Plant disease epidemic analysis and prediction models, Diseases due to angiospermic parasites (Loranthus, Orobranche, Cuscuta), Post harvest diseases in transit and storage and their control measures, Role of fungi as biofertilizers in agriculture, Industrial production of metabolites (organic acids, alcohol, antibiotics, single cell protein), Food preservation, contamination and spoilage, food borne illness and intoxication. Algae as biofertilizers, waste water treatment, bio-ethanol, hydrogen production, Isolation and Mass culture techniques of micro algae.

Unit – II

YK [Seed Storage Proteins:- Structure, biosynthesis & methods of improvement of their nutritional quality.

M [Intectual Proputy Rights : Patents Trademarks, copyright, Geographical Indicators in Indian Patent system, Plant varieties Act in Indian Patent System.

NLS [Biosafety and Bioethics in Biological research and Regulations.

Unit – III

NS [Drought resistance mechanisms:- Escape, dehydration postponement, Dehydration tolerance. Osmotic adjustment, Osmoprotectants.

Oxidative stress: reactive oxygen species (ROS) – role of scavenging systems (SOD, catalase etc.).

Breeding for salt and drought resistance.

Physical, physiological and chemical control of post – harvest deterioration of fruits, vegetables and cut flowers and its significance during storage and transport.

Physiology and biochemistry of differentiation, Tissue Culture in agriculture, horticulture, forestry and industry.

Unit – IV

SJ [Productivity:- Patterns, process and methods of analysis.

Biodiversity:- Patterns, processes, species diversity indices, strategies for Conservation.

Ecological Restoration:- Strategies, restoration of aquatic ecosystems.

Principles and approaches of forest management.

ANNEXURE

Course Title:

- **Research and Publication Ethics (RPE)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules

Faculty:

- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

About the course

Course Code: CPE- RPE

Overview

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	30

Syllabus in detail

THEORY

- RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 - Introduction to philosophy: definition, nature and scope, concept, branches
 - Ethics: definition, moral philosophy, nature of moral judgements and reactions
- RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 - Ethics with respect to science and research
 - Intellectual honesty and research integrity
 - Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 - Redundant publications: duplicate and overlapping publications, salami slicing
 - Selective reporting and misrepresentation of data
- RPE 03: PUBLICATION ETHICS (7 hrs.)**
 - Publication ethics: definition, introduction and importance
 - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 - Conflicts of interest
 - Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 - Violation of publication ethics, authorship and contributorship
 - Identification of publication misconduct, complaints and appeals
 - Predatory publishers and journals

PRACTICE

- RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**

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

• **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

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 (7hrs.)**

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

References

- Bird, A. (2006). *Philosophy of Science*. Routledge.
- MacIntyre, Alasdair (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.
- Resnik, 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/research/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>
- Indian National Science Academy (INSA), *Ethics in Science Education, Research and Governance*(2019), ISBN:978-81-939482-1-7. http://www.insaindia.res.in/pdf/Ethics_Book.pdf