

SYLLABUS FOR Ph.D. COURSE WORK IN ZOOLOGY

Ph.D. FIRST SEMESTER

SESSION – 2021-22 Onwards



**DEPARTMENT OF ZOOLOGY
SCHOOL OF BIOLOGICAL SCIENCES (SBS)
DR. HARI SINGH GOUR VISHWAVIDYALAYA
SAGAR (M.P.) 470 003**

Ph.D. COURSE SYLLABUS 2021-2022
DEPARTMENT OF ZOOLOGY
SCHOOL OF BIOLOGICAL SCIENCES
DR. HARISINGH GOUR VISHWAVIDYALAYA SAGAR, 470003 (M.P.)

I Semester

Paper course code	Paper Title	Credits
Paper I-SBS-CC-141	Research methodology	04
Paper II-ZOO-CC-142	Biostatistics and Informatics	04
Paper III-ZOO-CC-143	Review Writing	06
Paper-IV- CPE-RPE	Research and Publication Ethics	02
	Total Credits	16

Ph.D. COURSE, SESSION 2021-2022
DEPARTMENT OF ZOOLOGY
Course Code – ZOO C 141
COURSE TITLE: RESEARCH METHODOLOGY

L	T	P	C
4	0	0	4

12Hrs/Unit (Total: 60 Hrs)

Unit - I

Hypothesis & Research Design:

Defining, formulating & development of research hypothesis. Testing & development of working hypothesis. Types of research (descriptive, analytical, applied, fundamental, qualitative, conceptual and empirical) and research methods. Importance of literature review in defining a problem. Thrust area & innovation.

Unit - II

Computer application in biological research:

Basics, programmes, (Microsoft Excel, Word & PPT) and softwares (SPSS etc) used in research. Networking and modelling. Data mining and interpretation by use of computer. Data repository in knowledge bank (Gene Bank, Shodh Ganga, INFLIBNET etc.)

Unit - III

Scientific presentations & Writing:

Structure and components of scientific reports, Types of scientific reports and their preparation. Review, report, Paper & Thesis writing. Bibliography, referencing and citation for scientific writing.

Unit - IV

Basics principle, application & Techniques of sophisticated instruments used in biological research:

Microscopy (Confocal, Phase contrast, TEM, SEM) Centrifuge, Chromatography, Spectroscopy, Immunochemical Techniques (ELISA), Electrophoresis (DNA, Protein), PCR (routine and Real time)

Unit - V

Bio safety and Good Laboratory Practices:

International standards and concept of bio safety, bio safety levels & biohazards. Chemical & radiological hazards. Removal and disposal of biohazards. Concept of good laboratory practices. Safety related with genetically modified organisms. Ethics in use of animals and their disposal.

Suggested Readings:

1. Kothari, C. R. (2004). Research Methodology: Methods and Techniques, New Age International Publishers, New Delhi.
2. Day, R. A. (1998). How To Write & Publish a Scientific Paper, 5th edition, Oryx Press
3. Bell, F. D. Brown, W. C. (1994). Basic Biostatistics: Concepts for the Health Sciences. McGraw-Hill
4. Wilson, K. and Walker, J. M. (2000). Principles and Techniques of Biochemistry and Molecular Biology, 8th Edition, Cambridge University Press.
5. Plummer, D. T. (2004). An Introduction to Practical Biochemistry, Third Edition, Tata McGraw-Hill

Ph.D. COURSE, SESSION 2021–22
DEPARTMENT OF ZOOLOGY
Course Code – ZOO C 142
COURSE TITLE: BIOSTATISTICS & INFORMATICS

L	T	P	C
4	0	0	4

12Hrs/Unit (Total : 60 Hrs)

Unit – I

Collection, classification & diagrammatic representation of statistical data, frequency and frequency distribution, measures of central tendency: mean, median and mode.

Unit - II

Measures of dispersion: range, mean deviation, variance, standard deviation, standard error, skewness, kurtosis, regression & correlation, chi-square test, student's t-test, Parametric and non-parametric test, ANOVA and other statistical computer packages.

Unit - III

Definition, history, scope and applications of bioinformatics, Biological Databases: primary & secondary databases e.g. GenBank, EMBL, DDBJ, Entrez, OMIM, SWISS-Prot etc. Literature Databases: Open access and open sources, PubMed, PLoS, Biomed Central.

Unit - IV

Sequence alignment methods: pairwise and multiple sequence alignment, analyzing and retrieving databases, database similarity searches: BLAST & FASTA, Phylogenetic tree construction, Gene prediction, Protein and RNA structure prediction.

Unit - V

IPR in Bioinformatics, Computer Science, Medical research, Pharma, Biodiversity, Genetic resources & Biotechnology.

Suggested Readings:

1. Marketa, Z., Baum, J. (2008). Understanding Bioinformatics. Garland Science.
2. Lesk, M. (2009). Introduction to Bioinformatics. Oxford University Press
3. Ignacimuthu, S. (2013). Basic Bioinformatics. Narosa, Alpha science International
4. Claverie, J. M., Notredame, C. (2006). Bioinformatics for Dummies. Wiley Publishing, Inc., New York, USA
5. Pagano, M., Gauvreau, K. (2018). Principles of Biostatistics. 2nd Edition. Duxbury Press, USA
6. Sharma, V., Munjal, A., Shanker, A. (2008). A text Book of Bioinformatics. Rastogi Publications, New Delhi

Ph.D. COURSE, SESSION 2021–22
DEPARTMENT OF ZOOLOGY
Course Code – ZOO C 143
COURSE TITLE: REVIEW WRITING

L	T	P	C
1	1	4	6

Total: 90 Hrs

1. Survey of Literature; Data research using various platforms
2. Pico tool of Systematic review writing
3. Designing of the Research Problem
4. Formulation of Hypothesis
5. Description of Review content in the form of various types of Research.
6. Data analysis Procedure
7. Writing of Proposal for funding
8. Power point Presentation of reviewed literature
9. Submission and Presentation of review of literature with meta-analysis in Two Hard copies.

DEPARTMENT OF ZOOLOGY
Course Code – CPE-RPE
COURSE TITLE: RESEARCH AND PUBLICATION ETHICS

L	T	P	C
2	0	0	2

Total : 23 Hrs

Unit – I

RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)

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

Unit – II

RPE 02: SCIENTIFIC CONDUCT (5 hrs.)

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

Unit – III

RPE 03: PUBLICATION ETHICS (7 hrs.)

1. Publication ethics: definition, introduction and importance
2. Best practices/ standards setting initiatives and guidelines: COPE, WAME. Etc.
3. Conflict 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.

Unit – IV

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.

Unit – V

RPE 05: PUBLICATION MISCONDUCT (4 hrs.)

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflict 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

Unit – VI

RPE 06: DATABASE AND RESEARCH METRICS (7 hrs.)

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 Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g-index, i10 index, altmetric

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.nieh.nih.gov/research/resouces/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. https://www.insaindia.res.in/pdf/Ethics_Book.pdf