Veer Bahadur Singh Purvanchal University, Jaunpur

U.P- 222001

Syllabus of Pre Ph.D. Course Work in Zoology for University and Affiliated Colleges

(As Per Guidelines of U.P Government in Accordance with

National Education Policy-2020 with Effect from the session 2022-2023)

Convener Board of Studies
Prof. V.K. Tripathi
Department Of Zoology T.D.P.G. College Jaunpur

Courses of Pre Ph.D. (Zoology): In Pre Ph.D. there shall be three compulsory papers (16 credits=6+6+4) and one project work. The three papers will be as

1. Two papers will be related to the concern subject. Each paper will be of 6 credits (6+6 credits =12 credits).
2. One paper will be of Research Methodology and computer application. This paper will be of 4 credits.
3. A minimum 55% marks or its equivalent CGPA will be the passing marks.
4. Those students, who will qualify in all the papers separately, will be given post graduate diploma in research.
    A. Regarding semester rules of the University, if a candidate fails to secure qualifying marks in a paper, may be given another chance, but the registration process will remain standby for such candidate.
    B. If a candidate secures 16 credits but fails to appear in the examinations or even filling up of the exam form, may be given an opportunity to appear in the next ensuing examinations, till then the process of registration will remain standby.
    C. The period of research apart from course work will be considered from the date of registration.

Syllabus Developed by ***Dr. Dev Brat Mishra Department of Zoology T.D.P.G. College Jaunpur***

SUBJECT: Zoology Titles and code of the Papers in Pre Ph.D. (Zoology)

Course Code	Paper	Paper Title	Credit	Total Marks
B0501401T	Paper 1	Research Methodology & Computer Applications	04	100
B0501402T	Paper 2	Tools & Techniques	06	100
B0501403T	Paper 3	Seminar, Visit of higher learning centers	06	100

Paper 1.

Research Methodology & Computer

Applications Course code: B0501401T

UNIT I: Objective of research ,Research problem and techniques involved in defining a problem, Types of research, Assesment of current status of topic chosen, Litreture survey and reference collection, Formulation of hyphothesis, Research design, Ethics in research, Code of ethics fabrication of data, Scientific misconducts: Falsification, Fabrication, Plagiarism(FFP), Biosafety regulations in biological research and bioethics.

UNIT II: Types , sources , collection and tabulation of data, graphical representation, central tendency, chi-square test, t- and F tests , ANOVA- One way and two way.

UNIT III: Steps in writing report and research papers, layout of the research report, presentation of research (Abstract/Synopsis),Precautions in writing research reports, conclusions, Impact factor and Citation index.

UNIT IV: Publication ethics: 1. 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 behaviour 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 Electronic journals, e-books, digital libraries, searching research information using Jgate and SCOPUS, Science Direct.

Research Metrics-

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

UNIT V: Computer and Internet: Networking, different WAN and LAN connections, Connection to a network, Web Browsers, Internet security, Web Search Engine, MS Word, Handling graphics, tables and charts, Converting a word document to various formats like- text, rich text, word perfect, html, pdf, etc. MS Power Point: creating slide show with animations, creating a blank presentation, auto layout with power point screen, screen lay out and views, insert a new slide, applying design template, changing slide layout, reordering and hiding slides, slide show and editing, custom slides.

References:

Research Methodology: Methods and Techniques by C.R. Kothari, Second revised edition
Research Methodology: A step by step guide for beginners by Ranjit Kumar
Research Methodology: by Dr. Dev Brat Mishra (Dev)
Research methodology: Methods and Statistical techniques, by Santosh
Gupta Statistical Methods, by S.P. Gupta
Research Design, Qualitative, Quantitative and mixed method approaches, by W. Creswell, 3rd edition.
Information Communication Technology, by Tim Shorts Handbook of Communication and Social Interaction Skills, by John O. Green, Brant Raney Burleson.

Paper 2
Tools & Techniques Course code:
b0501402T

Unit I. Separation Techniques & Electrophoresis

Chromatographic Technique: Paper chromatography, Thin Layer Chromatography (TLC), High Performance Liquid Chromatography (HPLC), HPTLC, Gas -Liquid chromatography (GLC), Isoelectric Focussing.
Electrophoresis: PAGE, SDS PAGE, 1-D and 2-D gel electrophoresis, DIGE (Differential in Gel Electrophoresis). Separation of proteins through electrophoresis. Gel electrophoresis (AGE, 2D etc), Chip, EMSA, Co-Immunoprecipitation

Unit II. Microscopy & Microtomy
Microscopy: Principles of Microscopy, Confocal microscopy, Fluorescnce Microscopy, Electron Microscopy, Phase Contrast microscopy; Atomic Force Microscopy, Camera Lucida. **Microtomy:** Microtomy/ Microtome & it types: dehydration, clearing and embedding of material, section cutting, dewaxing. Different types of stains, their preparation and uses: Safranin, fast green, hematoxylin, iodine, cotton blue, crystal violet, ruthenium red, Janus green, Gram's stains, Acetocarmine.

Unit III. Spectroscopic Techniques:
General principles; Basic laws of light absorption; Types of spectra and their biological usefulness. Principle, application and instrumentation of UV-VIS spectrophotometry; FTIR, Atomic Absorption spectrophotometry; Raman Spectroscopy, MALDI-TOF; GCMS. 12 hours .

Unit IV. Bioinformatics ,
Computational biology Techniques and Tools: Techniques and tools for Sequences Alignment (Pairwise and multiple alignment), Phylogenetic analysis- Methods and Tools, gene prediction, ORF finding. Homology: Orthology & paralogy. Databases: NCBI, EMBL, DDBJ, Gene bank Pubmed; Ensembl, Phytozome etc Online tools – BLAST, ORF finder, Primer3, protein motif and structure prediction tools. Generation and analysis of whole genome data, Whole genome annotation taking examples of major plant genomes.

Unit V. Techniques of Molecular Biology & Sequencing Whole genome sequencing:
Whole genome shotgun sequencing; clone-by-clone or 'hierarchical shotgun' sequencing; pan genomes and metagenome. Next generation Sequencing Technologies: 454 Pyrosequencing, Reversible Terminator Sequencing, Single-Molecule Real-Time (SMRT) Sequencing and Nanopore Sequencing; microbial genomes (including yeast); plant genomes (Arabidopsis, rice). Application of NGS. Genome editing tools ZFN, TALEN and CRISPR, Anti CRISPR; Genome

annotation.

References:

A Biology Guide to Principles and Techniques of Practical Biochemistry. 2000. Wilson, & Goulding, KH. ELBS edition.

- Cooper Robert and Hausman. The Cell: A Molecular Approach; 2013. Sinauer Associates, Inc.; 6 edition
- Introduction to Instrumental Analysis. Robert Brown. Mc Graw Hill Internatiuonal Edition.
- Introduction to Practical Molecular Biology. Dabre, PG. John Wiley & Sons Ltd.
- Kuby Immunology (sixth edition).2006. Golds, RA. Thomas J. Kintz, Barbara, A. Osborne, Freeman & Co., New York.
- Microbiological Applications: A Laboratory Manual in General Microbiology. Benson, HJ. WCG; WnC Brown Publishers.
- Microbiology, a Laboratory Manual. 2013. Cappuccino, JG and Sherman, N. Addison Wesley.

Paper 3.
Seminar, Visit of higher learning centers
Paper Code: B0501403T

- Attends Conference/Seminar.
- Slide preparation, Power Point presentation.
- Visit of Research institutions.
- Visit of libraries & also consult the Digital library.
- Review of literature.
- Study of concern thesis on Shodhganga.