



DEPARTMENT OF ZOOLOGY
UTKAL UNIVERSITY, VANI VIHAR, BHUBANESWAR-751004

PhD COURSEWORK SYLLABUS
Effective 2020-21 onwards

Curriculum structure

Paper	Description	Full Marks	Examination pattern
Zoo-PP-701	Research Methodology, Scientific Ethics and Plagiarism	100	Theory paper of four hours duration
Zoo-PP-701	Research tools and techniques	100	Theory paper of four hours duration
Zoo-PP-701	Seminar	100	Power point presentation of about one hour and deposition of the hard and soft copies for evaluation
Zoo-PP-701	Project	100	A dissertation based on research work conducted or a review article on a relevant topic is to be prepared in consultation with a faculty or mentor and submitted to the department within six months for evaluation
Total Marks		400	

Paper I: Zoo-PP -701

Research Methodology, Scientific Ethics and Plagiarism

1. Research Ethics: Ethical issues in research; IPR; Biosafety and Importance of bioethics.
2. Review of literature, Developing and testing hypothesis, Writing a dissertation, Plagiarism.
3. Bioinformatics: Philosophy of Rene Descartes Measurement, sensitivity, accuracy, precision and specificity. The limits and range of Measurement in different systems, Experimental design, single and double blind studies, placebo.
4. Statistical analysis such as t test, chi square test, Analysis of Variance (ANOVA), F test; Regression analysis and Coefficient of Correlation; Wilcoxon Rank Sum test, Mann-Whitney U test, Kruskal-Wallis test, Kolmogorov-Smirnov test; Rank Correlation; Principal Component Analysis
5. Culture of microbes: Streaking, Gram's technique, Media preparation; and Animal tissue culture technique.
6. Rearing of tasar, eri, and mulberry silk insects and study of different stages of life cycle.
7. Micronucleus test of smears like buccal mucosal cells, cervical cancer smear and their analyses.
8. Study of chromosomal aberration through mutagenic treatment; Karyotype and Karyomorphometrical analysis; Banding of Chromosomes.

Paper II: Zoo-PP-702

Research Tools and Techniques

1. Analytical techniques and instrumentation - I: CLIA, SEM, TEM, Fluorescence and Confocal microscopy.
2. Analytical techniques and instrumentation -II:Mass spectrophotometry (LCMS, GCMS and MALDI-TOF); Flow Cytometry; Radioisotope techniques;Liquid scintillation counting; Autoradiography; MRI (Magnetic Resonance Imaging);Computer Aided Tomography.
3. Extraction of nucleic acids
4. Microtomy and Immunohistochemistry.
5. Rearing and study of different developmental stages of anuran tadpoles.
6. Differential staining of cartilages and bones by Alcian blue and Alizarin red methods.
7. Model systems and model organisms: Pre-requisites of a model system; in vitro systems; Prokaryotic model organisms; Eukaryotic model organisms
8. Soil and water analysis; Heavy metals and pesticides in tissue.
9. Omics approach: Genomics, Transcriptomics, Epigenomics, Proteomics, Metabolomics
10. Nanobiotechnology: Methods and applications.