



जननायक चन्द्रशेखर विश्वविद्यालय, बलिया-277001 (उ.प्र.)
Jananayak Chandrashekhar University, Ballia-277001 (U. P.)



FACULTY OF SCIENCE

Course structure and Syllabus

Ph.D. Course work system

ZOOLOGY

UNDER SEMESTER SYSTEM

ACADEMIC SESSION -2019-20



Ph.D. (Doctor of Philosophy)

ZOOLOGY

FACULTY OF SCIENCE

SEMESTER SYSTEM

Ph.D.ZOOLOGY

COURSE WORK SYSTEM COURSE STRUCTURE, SYLLABUS/Ph.D. COURSE WORK

1. PAPER-I-Research Methodology and Computer Application Credits-4, MM-100
2. PAPER-II- Research and Publication Ethics Credits-2, M.M.-100
3. PAPER-III- Zoology- Frontiers in Biological Research Credits-4, M.M.-100
4. PAPER- IV- Zoology- Frontiers in Biological Research Credit 4, MM.:100

Total-14 Credits and Maximum Marks-400

After the completion of course work

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|------------------------------------|--------------|
| 1. SYNOPSIS SEMINAR | Satisfactory |
| 2. ORAL COMPREHENSIVE | Satisfactory |
| 3. COURSE SEMINAR | Satisfactory |
| 4. THESIS PRE SUBMISSION SEMINAR | Satisfactory |
| 5. THESIS (DOCTORAL RESEARCH WORK) | Satisfactory |
| 6. THESIS VIVA-VOCE | Satisfactory |

PROPOSED REGULATIONS

Semesters/Papers	Title of the papers	Theory	
		Max. Marks	Min. Marks
Paper 1	(Theory Paper)	100	40
Paper 2	(Theory Paper)	100	40
Paper 3	(Theory Paper)	100	40
Paper 4	(Theory Paper)	100	40
Total aggregate of First Semester will be 50 %			Max. Marks – 400 Min.Marks – 200
SYNOPSIS SEMINAR			Satisfactory
ORAL COMPREHENSIVE			Satisfactory
COURSE SEMINAR			Satisfactory
THESIS PRE-SUBMISSION SEMINAR			Satisfactory
THESIS (DOCTORAL RESEARCH WORK)			Satisfactory
THESIS VIVA-VOCE			Satisfactory

Note-

1. The research work may be initiated as per Ph.D. ordinance.

2. The evaluation of seminar presentation and oral comprehensive examination shall be done by the departmental committee which shall be constituted by the Head of Department /Principal of College.
3. The minimum passing marks of every paper at least will be 40 % in theory and total aggregate of the semester will be 50 % minimum.

Syllabus for pre Ph.D. course work

ZOOLOGY

COURSE STRUCTURE

SYLLABUS of Ph.D. COURSE WORK

PAPER-I: RESEARCH METHODOLOGY AND COMPUTER APPLICATION

4 Credits, M.M.100

(Common Syllabus)

PAPER-II: RESEARCH AND PUBLICATION ETHICS

Credits-2, M.M.-100

(As per UGC Recommendation)

(Common Syllabus)

PAPER III- Zoology-Tools and Techniques in Research

Credit 4, MM.:100

UNIT 1: Histology and Cell Biology Techniques

15 Hrs

Microscopy: Basic principle and types

Histological Techniques: Pretreatment, fixatives and stains; Microtomy: Fixation, block formation, section cutting, staining.

Cell culture techniques: Primary and secondary culture, Cell lines and their maintenance, Cryopreservation.

Detection of gene expression at cellular level: In situ hybridization, Immunocytochemical detections.

Bioinformatics: Data archiving systems: FASTA format, Accession, and GI-Number, Databases, search and retrieval.

Animal handling, Fish collection, Identification of fish, Fish Taxonomy

UNIT 2: Biochemical Tools and Techniques

15 Hrs

Centrifugation: Basic Principles underlying different types of Centrifuges.

Electrophoresis: Principle and applications of PAGE (native, denaturing and 2D) and Agarose gel electrophoresis.

Principles and Methodology of Colorimetry, Spectrophotometry, pH meter.

Isolation and estimation of Protein, DNA, RNA, Carbohydrate, Cholesterol, Calcium etc.

Principle and applications of bioassay, ELISA; Hematological Tests. Cell viability and apoptosis

UNIT 3: Practical Exercise

20 Hrs

- A. Animal handling, Maintenance of Animal House and Museum, Fish collection, and Identification of fish
- B. Histology and Microtomy: Preparation of Histological stains, Preparation and Histological slides
- C. Labeling of cell organelles and Immunostaining

UNIT 4: Practical Exercise

10 Hrs

- A. Retrieval of Research Articles and Databases.
- B. To Isolate and estimate the concentration of Protein, DNA, and RNA, Carbohydrate, Cholesterol, Calcium.
- C. ELISA; Hematology. Cell viability and Apoptotic Assays

Books Recommended-

1. Wilson K and John Walker., Principles and Techniques of Practical Biochemistry
2. Sundararaj, P and Siddu, A., Qualitative Tests and Quantitative Procedures in Biochemistry
3. Snell, N., Sams Teach Yourself: Computer Basics
4. Gupta, V., Rapidex Computer Course

PAPER-IV- Zoology- Frontiers in Biological Research Credit 4, MM.:100

UNIT 1: Ecology and Toxicology

12 Hrs

Biodiversity, Endangered species, conservation and management, biodiversity act: national and international conventions, Environmental stresses and their management, global warming, biodegradation and bioremediation, Mutagens, heavy Metal toxicity (Al, As, Cd etc), Pesticides.

UNIT 2: Microbiology, Biotechnology and Immunology

18 Hrs

Introduction to recombinant DNA technology: Restriction endonucleases, Cloning vectors, Transformation. Designing of primers, polymerase chain reaction, DNA sequencing, Site directed mutagenesis, Microarray, DNA fingerprinting. Human cytogenetics and genetics.

Animal viruses, and Bacteria and their culture: aseptic technique, primary culture, organotypic cultures

Innate and acquired immunity, Antigen (Ag) and antibodies (Ab), interaction of Ag and Ab, Immunotherapies

Cancer, genetics and environmental factor associated with cancer growth and development, Genes Associated with Cancer Control Cell Proliferation and Survival, Anticancer- bioactive herbal molecules and compounds, Mutations.

UNIT 3: Practical Exercise

- A. To estimate: BOD and COD of water sample
- B. Turbidity assessment
- C. Counting of Zooplankton in different water samples

UNIT 4: Practical Exercise

- A. To Amplified DNA segment with Polymerase chain reaction, Restricted Fragment Length polymorphism
- B. Antigen and Antibody interaction (Blood Grouping), and Immunodiffusion

Books Recommended-

Odum, E.P., Fundamentals of Ecology

Alberts et al: Molecular Biology of the Cell

Baltimore L., Molecular Biology of Cell

Glick, B. R. & Pasternak J.J., Molecular Biotechnology: Principles and Applications of Recombinant DNA

Singh, R.P., Microbiology,

Willey, Joanne M, Sandman, K., Wood, D., Prescott's Principles of Microbiology

Pandey, K., Fundamentals of Toxicology

Kuby Immunology; Punt, J, Sharon A., Stranford, P.P. Jones, and Owen

