SYLLABUS FOR
Ph.D. COURSE WORK IN ZOOLOGY
2020

DEPARTMENT OF ZOOLOGY
DIAMOND HARBOUR WOMEN'S UNIVERSITY

PREAMBLE

Ph.D. COURSE WORK AND COURSE-END EXAMINATION

1. Each Ph.D. student has to complete a course work of six months duration. There are four courses consisting total 200 marks and 08 credits
2. For the course work and related matters, the UGC Regulation 2016 will be followed.
3. There are two compulsory papers i.e. Research Methodology (ZOO/PhD/CP/01), Review of research work and presentation (ZOO/PhD/CP/02) which all the Ph.D. students have to study.
4. Each student has to study two elective papers.
5. The department will offer any two elective papers as per the existing infrastructure.
6. Each candidate has to prepare a dissertation project and submit it at the semester end examination.
7. A course end examination will be held and it is to be conducted by the University.
8. A student must obtain 50% marks in the course work examination to qualify.

OUTLINE STRUCTURE OF Ph.D. COURSE WORK IN ZOOLOGY

Serial no.	Course type	Paper code	Paper name	Marks	Credits
1.	Compulsory	ZOO/Ph.D./CP/01	Research methodology	50	2
2.	Compulsory	elective	Review of research work and presentation	50	2
3.	**Elective** ***(Any two)***				
i.	Elective	ZOO/Ph.D./ EP/01	Conceptual approaches in disease biology	50	2
ii.	Elective	ZOO/Ph.D./ EP/02	Environmental toxicology	50	2
iii.	Elective	ZOO/Ph.D./ EP/03	Coastal Aquaculture and Mariculture	50	2
iv.	Elective	ZOO/Ph.D./ EP/04	Selected techniques in zoological research	50	2
	Total (2 compulsory papers + 2 Elective papers)			**200**	**8**

Note: Two Elective papers will be offered to the students as per the existing infrastructure.

Ph.D. Course Work in Zoology

Compulsory Papers

Paper: ZOO/Ph.D./CP/01

(Research Methodology)
Marks: 50

1. **Scientific Research**: Definition, Characteristics, types, Selection of topic, objectives, experimental design

2**. Literature survey**: Software based reference management. Possible ways of searching of current literature.

3. **Documentation and scientific article writing:** Category of Research Journals, Impact factor, Formats for writing a Research article, reviews, project proposal writing.

4. **Ethical issues regarding experiments with animal and human subjects.**

5. **Intellectual Property Right (IPR).**

6. **Essential biostatistical method:** Calculation of sample size, Central tendency and dispersion, Hypothesis testing,

7. Bioinformatics tools: Introduction to Bioinformatics; Bioinformatics data types, sequence alignment, databases.

7. **Computer Applications:** Word processing software, Presentation software, Scientific data analysis and graphing software

Paper: ZOO/Ph.D./CP/02

(Review of research work and presentation)

Marks:50

1. Literature review.
2. Presentation of the review paper.
3. Viva-voice.

Submission of Dissertation copy which must be prepared in respect to the following guidelines:

a) Title of the Review work
b) Reason for selection of such a topic for review work

c) A clear-cut account of the research findings in respect to name of the researchers and the of the records available in literatures, in a befitting way, successively, with complete references at the end of the text.
d) Add your comments following analyses of the data used to review the problem considered for your work

2. Oral presentation with slides of the work you described in your submitted dissertation copy.

3. Interactions (Viva-voice)

Elective papers

Paper: ZOO/Ph.D./ EP/01

(Conceptual approaches in disease biology)
Marks:50

1. Signaling crosstalk, Cell cycle regulation and cell death.
2. Cancer biology and Stem cell concept
3. Diagnostics and Therapeutics of Genetic Disorder
4. Immunotherapeutic and immunomodulators in modern medicine
5. Environmental immunotoxicants
6. Vaccinology in the 21st century, Drug development processes.
7. Parasite versus host: pathology and disease and challenge of parasite control.
8. Zoonosis and Emerging and remerging infectious diseases in India
9. Role of vector's microbiota on the propagation of parasitic diseases.

Paper: ZOO/Ph.D./ EP/02

(Environmental toxicology)
Marks:50

1. Major classes of environmental pollutants and their mechanism of toxicity
2. Biotransformation of xenobiotics
3. Toxicity testing methods and animal models
4. Transport of contaminants in ecosystems
5. Endocrine disruptors
6. Mutagenic pollutants in the environment
7. Biomarkers
8. Emerging environmental contaminants
9. Status of major pollutants in Gangetic delta
10. Emerging technologies for management and control of environmental pollution

Paper: ZOO/Ph.D./ EP/03

(Coastal Aquaculture and Mariculture)
Marks:50

1. Status of coastal aquaculture in India
2. Brackish water as a medium for aquaculture and present status of brackish water farming in India. Issues and challenges of management of brackish water systems.
3. Ecological factors: Abiotic and biotic factors, Selection of site, general planning, design of brackish water farms.
4. Zonation of marine habitat.
5. Coral reef: Importance and threats
6. Classification of estuaries, ecology of major estuaries.
7. Brackish water Finfish and Shellfish culture- *Chanos chanos, Mugil cephalus, Penaeus Monodon, Penaeus indicus.*
8. Expensive, semi- intensive and intensive shrimp farming, Crab culture.

Paper: ZOO/Ph.D./ EP/04

(Selected techniques in zoological research)
Marks:50

1. Animal care, handling and management.
2. Animal cell culture techniques, biosafety and biohazards
3. Isolation and separation of cells of immune system, Techniques to assess innate and adaptive immunity
4. DNA barcoding, metagenomics
5. Microscopy, Flowcytometry, Spectrophotometry and mass spectrometry, Chromatography.
6. Molecular biology techniques - PCR, electrophoresis (IEF & 2D), Immunoprecipitation (IP, Co-IP, ChIP, RIP), Transfection,
7. Genome editing technology - CRISPR-Cas9.