

## Syllabus for Ph. D. (Science) Course Work, Department of Zoology, UGB



### UNIVERSITY OF GOUR BANGA, MALDA

Department of Zoology

Ph. D. (SCIENCE) COURSE WORK ONE SEMESTER SYLLABUS, ZOOLOGY  
(With effect from the session 2014-2015)

#### Gross Description of Papers and Allotted Marks

Paper	Code	Group	Marks
Research Methodology & Review of Research Work	ZCW 1	A: Research Methodology	50
		B: Review of Research Work	50
Total Marks			100
Integrative Biology	ZCW 2	A: Recent Advances in Entomology	25
		B: Recent Advances in Microbiology	25
		C: Recent Advances in Immunology	25
		D: Recent Advances in Applied Zoology	25
Total Marks			100
Full Marks			200
<b>Question patterns to be set:</b> <b>Paper ZCW 1:</b> <b>Group A:</b> Question 1: Compulsory Question 2: Two questions to be attempted out of four Question 3: Two questions to be attempted out of four <b>Group B:</b> Review of Research Work  <b>Paper ZCW 2:</b> Question 1: Compulsory Question 2 to 5 (From group A to D): Two questions to be attempted out of four, from each of the groups			

# **Syllabus for Ph. D. (Science) Course Work, Department of Zoology, UGB**

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## **Paper ZCW 1: Research Methodology & Review of Research Work**

### **Group A: Research Methodology**

**50 Marks**

#### **1. Instrumentation in Life Science Research**

- (a) Colorimeter, spectrophotometer, ELISA, FACS, Latex agglutination, Haemagglutination
- (b) *Microscopy*: Fluorescence microscopy, SEM and TEM
- (c) *Chromatographic techniques*: Chromatography- Principles and Practice, GC-MS, HPLC, HPTLC
- (d) *Electrophoresis*: SDS-PAGE, agarose gel electrophoresis
- (e) *Centrifugation*: Basic principles of sedimentation, differential and density gradient centrifugation, Crystallography and X-ray diffraction
- (f) *Polymerase chain reaction*: Types and their applications

#### **2. Statistics and Bioinformatics**

- (a) Concept of probability, Binomial and Poisson distribution, Normal distribution, Law of probability and analysis of variance (ANOVA).
- (b) Test of significance, t-test,  $\chi^2$ -analysis, correlation, regression and probit analysis.
- (c) Statistical analysis packages. Introduction to XLSTAT, SPSS software.
- (d) Knowledge of various data bases: nucleic acid sequence, protein sequence and genome sequence data bases; sequence based data base searches
- (e) Phylogenetic analysis: Method of construction of phylogenetic trees

### **Group B: Review of Research Work**

**50 Marks**

The review work on selected topic to be submitted in 4 copies to the HOD of Zoology, UGB covering the following points:

- 1. Abstract
- 2. Introduction
- 3. Identification of the problem
- 4. Review and analysis
- 5. Future scope
- 6. Summary
- 7. References

Word limit: Text- 2000 to 3000 words, Abstract- 300 to 500

# **Syllabus for Ph. D. (Science) Course Work, Department of Zoology, UGB**

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## **Paper ZCW 2: Integrative Biology**

### **Group A: Recent Advances in Entomology**

**25 Marks**

- (a) Insect Sampling Protocols: Sampling of soil, aquatic and areal insects, different methods of insect sampling and their limitations, application of GIS for insect migration
- (b) Insect Taxonomy: Use of modern tools in insect classification
- (c) Insect Plant Interaction: Parametric evaluation of host plant, Growth/seasonal dynamics of pests, assessment on biochemical properties of host plant, Iso-enzyme analysis
- (d) Life Table and Morphometrics: Factors influencing insect life cycle, construction of life table, analysis on mortality factors, Image analysis for morphometrics and body colour analysis.
- (e) Crop and Grain Loss Management: Factors determining crop losses, ETL, EIL, important agro-climatic parameters, mechanism of damage and location, types of losses, grain/crop loss assessment, determination of threshold value. Process of Trichocard preparation, generation of pest calendar at regional level
- (f) Insect Behaviour: Acute motion analyses using high-speed video, modulation of insect behaviour in presence of stimuli, food choice testelectro-antennogram.
- (g) Forensic Entomology: Fauna, succession of fauna, PMI determination, applications.

### **Group B: Recent Advances in Microbiology**

**25 Marks**

- (a) Infection, infectious diseases and epidemiology; gut microbiota and probiotics.
- (b) Antimicrobial agents: mechanism of action and resistance development in bacteria.
- (c) Isolation, identification and preservation of microorganisms from clinical, environmental and food samples; antimicrobial susceptibility testing (NCCLS/CLSI guidelines). Culture media and culture techniques of microorganisms.
- (d) Vector biology: Tick borne diseases; malaria. Mosquito refractoriness to the control agents (molecular basis).
- (e) Viral infection of gastrointestinal and respiratory systems; AIDS and HIV— replication cycle and clinical disease progression, transmission, diagnosis, and treatment and vaccination.

### **Group C: Recent Advances in Immunology**

**25 Marks**

- (a) Immune system of the body
- (b) Hypersensitivity and allergic reactions
- (c) Regulation of Immune System
- (d) Tumour Immunology
- (e) Transplantation and Immune reaction
- (f) Gender difference in immune system
- (g) Immune disorders and Immunotherapy
- (h) Principles of vaccination and preparation of vaccines

### **Group D: Recent Advances in Applied Zoology**

**25 Marks**

- (a) Transgenesis, cryopreservation, sex reversal, hybridization- use of synthetic hormones; Fish Nutrition: feed- formulation, evaluation, conventional and non-conventional fish feed

## **Syllabus for Ph. D. (Science) Course Work, Department of Zoology, UGB**

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- (b) Genome analysis of model animals, human genome project, gene manipulation and related techniques, transgenesis and GM organisms
- (c) Toxicology: acute and chronic toxicology; determination of LC<sub>50</sub>, LD<sub>50</sub> and LT<sub>50</sub>; Xenobiotics and Bioremediation; Waste management- methods and techniques
- (d) Hormonal disorders in human and their management
- (e) Hormone regulation in glucose metabolism
- (f) Cell signaling
- (g) Molecular basis of host parasite interaction; Molecular detection related to parasitic diseases- tools and techniques

**END**