POST-GRADUATE DEPARTMENT OF ZOOLOGY
UNIVERSITY OF JAMMU.JAMMU-180006

Course no: Ph.D.Zool-01
Credit : 4
Course title: Techniques in Zoology

Maximum marks :100
Time: 2 :30 hrs.

Syllabus for the Ph.D course work examination to be held in 2025, 2026, 2027

UNIT: 1 Analytic techniques

1.1 Paper chromatography, Thin layer chromatography, Gas-liquid chromatography
1.2 Colorimetry- principle and techniques
1.3 Spectrophotometry- principles and techniques
1.4 Polymerase chain reaction, Ultracentrifugation

UNIT: II Principles and Practices of statistical methods in biological research

2.1 Standard error and deviation
2.2 Simple correlation regression
2.3 Test of statistical significance
2.4 Analysis of Variance

UNIT :III Entomological techniques

3.1 Preparation of killing bottles
3.2 Different techniques used for collection of insects
3.3 Various methods of preserving the terrestrial and aquatic insects
3.4 Techniques used to study the population of insects

UNIT: IV Limnological Techniques

1.1 Qualitative estimation of phytoplankton(chlorophycea, baciliriophycea)
1.2 Qualitative estimation of zooplankton(protozoa, cladocera, copepod, rotifer, ostracoda)
1.3 Quantative estimation of phytoplankton and zooplankton
1.4 Physico- chemical estimation: temperature, pH, depth, speed, Dissolved Oxygen , Free Carbon-di oxide, Carbonate, bicarbonate

Unit :V Culturing and Aseptic techniques

5.1 Types of media: broth ,semi solid and solid
5.2 Inoculation and isolation methods
5.3 Autoclaving , Gram staining
5.4 Biochemical tests

NOTE: Examiner to set 10 question of equal marks and student is required to attempt any 5 questions selecting one from each unit

POST-GRADUATE DEPARTMENT OF ZOOLOGY
UNIVERSITY OF JAMMU.JAMMU-180006

Course no: Ph.D.Zool-02

Maximum marks :100

Credit : 4

Time: 2.30 hrs

Course title: Cell Biology and Molecular Genetics

Syllabus for the Ph.D course work examination to be held in 2025, 2026, 2027

Unit 1: Cell signaling

1.1 Three strategies of chemical signaling: Endocrine, Paracrine, Synopsis

1.2 Signaling mediated by intra cellular receptor

1.3 Mechanism of transduction by cell surface receptor proteins

1.4 Mode of action of cyclic AMP and Ca2+

Unit 2: Developmental Genetics

2.1 Factors controlling development

2.2 Changes in nucleus during development

2.3 Gene regulation and use of markers during development

2.4 Genetics of development in Drosophila: Gap genes, Pair rule genes , Segmental polarity genes and homeotic genes

Unit 3: Birth , growth and death of neurons

3.1 Generation of neurons, migration of new- born neurons

3.2 Connection of neurons

3.3 Cell death in neurons

3.4 Growth cone in neurons

Unit 4:Cell death

4.1 Mechanism of apoptosis in mammals

4.2 Cell death in *C.elegans*

4.3 Apoptosis in drosophila: extrinsic and intrinsic pathways

4.4 Apoptosis targeted therapies in cancer

Unit 5: Genetics of cancer

5.1 Proto-oncogene activation, Oncogenes

5.2 Cellular function of oncoprotein, Regulation of gene expression by oncoprotein

5.3 Tumor suppressor genes or anticancer gene

5.4 Inherited cancer genes

NOTE: Examiner to set 10 question of equal marks and student is required to attempt any 5 questions selecting one from each unit.

POST-GRADUATE DEPARTMENT OF ZOOLOGY
UNIVERSITY OF JAMMU.JAMMU-180006

Course no: Ph.D.Zool-03
Credit : 4
Maximum marks :100
Time: 2.30 hrs
Course title: Fisheries and Aquaculture

Syllabus for the Ph.D course work examination to be held in 2025, 2026, 2027

Unit 1: An introduction to Aquaculture

1.1 Definition ,history, scope and present status of aquaculture
1.2 Criteria for selection of sites for aquaculture
1.3 Biological characters of culturable fishes
1.4 Culture of *Labeo* ,Trout ,Cat fish , Prawn

Unit 2: Ornamental fish culture

2.1 Breeding and rearing of exotic and indigenous ornamental fishes
2.2 Setting up and maintenance of fresh water aquarium
2.3 Water quality management
2.4 Trade regulations in relation to ornamental fishes

Unit 3: Quality standards

3.1 Assessment of quality of sea food by chemical methods
3.2 Fish food borne human pathogens
3.3 Concept of quality management
3.4 Food safety standards of fish products

Unit 4: Breeding in fishes

4.1 Natural breeding in Indian major carps
4.2 Location of breeding grounds
4.3 Induced breeding in fishes
4.4Fecundity- estimation and factors influencing fecundity

Unit 5: Fish nutrition and feeding in fish

5.1 Nutritional requirements of fishes
5.2 Fish food ingredients and types of feed
5.3 Feed formulation and processing
5.4 Feeding methods and growth variation

NOTE: Examiner to set 10 question of equal marks and student is required to attempt any 5 questions selecting one from each unit

POST-GRADUATE DEPARTMENT OF ZOOLOGY

UNIVERSITY OF JAMMU.JAMMU-180006

Course no: Ph.D.Zool-04

Credits : 4 Maximum marks :100

Course title: Limnology Time: 2.30 hrs

Syllabus for the Ph.D course work examination to be held in 2025, 2026, 2027

Unit 1: An introduction to Limnology

1.1 Definition of Limnology

1.2 Status of Limnology: Past, Present and Future

1.3 Water and its properties, measurement of water flow

1.4 Origin and classification of water bodies

Unit 2: Physical factors

2.1 Light as physical factor

2.2 Measurement of light and underwater light

2.3 Heat measurement

2.4 Thermal stratification

Unit 3: Biological factors

3.1 Composition , classification and seasonality of Phytoplankton

3.2 Composition , classification and seasonality of zooplankton

3.3 Composition , classification and seasonality of benthos

3.4 Eutrophication and its control measures

Unit 4:Comparative and regional limnology

4.1 Lakes in temperate zones

4.2 Lakes in tropical climates

4.3 Esturies

4.4 Riverine systems

Unit 5: Applied Limnology

5.1 Lake Washington: water diversion

5.2 Lake Tremmen : Dredging

5.3 Lake Tahoe: preventive measures

5.4 Flushing , aeration, mixing, plant harvesting and chemical control of water bodies

NOTE: Examiner to set 10 question of equal marks and student is required to attempt any 5 questions selecting one from each unit

POST-GRADUATE DEPARTMENT OF ZOOLOGY
UNIVERSITY OF JAMMU.JAMMU-180006

Course no: Ph.D.Zool-05
Credit : 4
Course title: Entomology

Maximum marks :100
Time: 2 :30 hrs.

Syllabus for the Ph.D course work examination to be held in 2025, 2026, 2027

UNIT: 1 Insect behavior and Insect – plant relationship

1.1 Social insects: social organization, cost differentiation and evolution of social instinct.
1.2 Honey bees and termites as social units
1.3 Luminescent insects
1.4 Plant stimuli and insect response

Unit : II Patterns of Insect-plant relationship

2.1 Host selection
2.2 attractants and repellants
2.3 Plants characteristics in host plant selection
2.4 Behavioral and physiological components in insect plant relationship

Unit :III Insect communication

3.1 Chemical communication: Pheromones, kairomones, allomones , synomones
3.2 Audio communication :Sound production , Sound reception
3.3 Visual communication : Compound eye and ocelli
3.4 Tactile communication: mechano receptors

Unit :IV Major ecological role of insects

4.1 Insects and herbivores (Phytophagy) : Leaf chewing , Plant mining and boring , Sap –sucking , Gall formation
4.2 Insect as pollinators
4.3 Insects as predators and parasites: prey –host location , prey –host acceptance
4.4 Role of termite in forestry

Unit :V Defence mechanism in Insects

5.1 Behavioral defence : defence by hiding
5.2 Structural defence : mechanical defence
5.3 Chemical defence: sources and organs of chemical defence
5.4 Mimicry : Batesian mimicry , Mullerian mimicry

NOTE: Examiner to set 10 question of equal marks and student is required to attempt any 5 questions selecting one from each unit

POST-GRADUATE DEPARTMENT OF ZOOLOGY
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Course no: Ph.D.Zool-06
Credit : 2 **Maximum marks :50**(25 Theory+25 Practice)
Course title: Research and Publication ethics **Time: 2 hrs(both)**

Syllabus for the Ph.D course work examination to be held in 2025, 2026, 2027

PAPER A: THEORY

Unit 1: Philosophy and ethics

1.1 Introduction to Philosophy: definition , nature and scope, concept branches

1.2 Ethics : definition, moral philosophy, nature of moral judgments and reactions

Unit 2: Scientific conduct

2.1 Ethics with respect to science and research

2.2 Intellectual honesty and research integrity

2.3 Scientific misconducts: Falsification, fabrication and Plagiarism (FFP)

2.4 Redundant publications: duplicate and overlapping publications, salami slicing

2.5 Selective reporting and misrepresentation of data

Unit 3: Publication ethics

3.1 Publication ethics : definition, introduction and importance

3.2 Best practices/standards setting initiatives and guidelines : COPE, WAME etc

3.3 Conflicts of Interest

3.4 Publication misconduct : definition, concept, problems that lead to unethical behavior and vice versa, types

3.5Violation of publication ethics, authorship and contributor ship

3.6 Predatory publishers and journals

PAPER B: PRACTICE

Unit 4: Open access publication

1 Open access publications and initiatives

2 SHERPA/ RoMEO online resource to check publisher copyright and self-archiving policies

3 Software tool to identify predatory publications developed by SPPU

4 Journal finder/journal suggestion tools viz. JANE, Elservier journal finder, Springer journal suggester etc.

Unit 5 : Publication misconduct

A) Group discussion

1) Subject specific ethical issues, FFP, authorship
2) Conflicts of interest
3) Complaints and appeals :examples and fraud from India and abroad

B) Software tools

Use of plagiarism software like Turnitin, Urkund and other open source software tools

Unit 6: Databases and research metric

A: Databases

1) Indexing databases
2) Citation databases : web of sciences, Scopus ,etc

B: Research metrics

1) Impact factors of journal as per journal citation report ,SNIP,SJR,IPP,CITE score
2) Metrics : h- index , g index , i10 index , altmetrics

POST-GRADUATE DEPARTMENT OF ZOOLOGY
UNIVERSITY OF JAMMU.JAMMU-180006

Course no: Ph.D.Zool-07
Credit : 2
Course title: Biostatistics

Maximum marks :50
Time: 2 hrs

Syllabus for the Ph.D course work examination to be held in 2025, 2026, 2027

Unit 1: Foundations of biostatistics

1.1 Definition, scope and applications of biostatistics
1.2 Collection ,organization and representation of data(graphical-bar, histogram, Frequency polygon, Line diagram and diagrammatic)
1.3 Basic statistics- Arithmetic, Harmonic mean, Geometric mean
1.4 Median, Mode, mean deviation

Unit 2: Probability and statistical inference

2.1 Statistics of dispersion, Coefficient of variation
2.2 Standard error and Confidence limits
2.3 Probability distribution (binominal, poission and normal)
2.4 Testing of hypothesis, level of significance, Type- I and II errors

Unit 3: Advanced statistical methods

3.1 Tests of statistical significance(Students t –test, Z-test, Chi-square test)
3.2 Correlation and regression
3.3 Analysis of Variance (One – way and two – way ANOVA)
3.4 Basic introduction to Multivariate statistics

NOTE: Section A of 5 marks short questions from complete syllabus
Section B for 45 marks ,examiner to set 6 question of equal marks (15 marks)and student is required to attempt any 3 questions selecting one from each unit