CHOICE BASED CREDIT SYSTEM (CBCS) IN ZOOLOGY

Total credit = 64

Credit (Core 48 + Elective 16)

Compulsory Credit 4 = Foundation Course (Computer Application)

Semester I

Core Course		Credit	Elective Course		Credit	Total Credit
ZOOL701C	Animal Diversity (Non Chordates and Chordates)	4				4
ZOOL702C	Developmental Biology & Endocrinology	4				4
ZOOL703C	Biochemistry and Animal Physiology	4				4
ZOOL704C	Laboratory Exercise	4				4

Semester II

Core Course		Credit	Elective Course		Credit	Total Credit
ZOOL801C	Tools and Techniques and Histology	2	ZOOL801E/	Quantitative Zoology/ Aquatic Environmental Science	2	4
ZOOL802C	Cell Biology and Genetics	4				4
ZOOL803C	Ecology & Environmental Zoology	4				4
ZOOL-804C	Laboratory Exercise	4				4

Semester III

Core Course		Credit	Elective Course		Credit	Total Credit
ZOOL901C	Applied limnology & Ethology	4				4
ZOOL902C	Parasitology and Immunology	4				4
			ZOOL903E1/ ZOOL903E2/ ZOOL903E3/		4	4
ZOOL-904C	Laboratory Exercise	2	ZOOL904E	Laboratory Exercise	2	4

Semester IV

Core Course		Credit	Elective Course		Credit	Total Credit
ZOOL1001C	Biosystematics and Evolution	4				4
ZOOL1002C	Molecular Biology	2	ZOOL1002E	Insect Taxonomy/ Soil Zoology	2	4
			ZOOL1003E1/ ZOOL1003E2/ ZOOL1003E3/		4	4
ZOOL1004C	Laboratory Exercise	2	ZOOL1004E	Laboratory Exercise	2	4
Total Core Credit		48	Total Elective Credit		16	64

20/2/15 Priyanka Chandra 20/2/15 20/2/15 20.2.15

Head
Department of Zoology
Tripura University
Suryamaninagar

Paper No.

ZOOL903E1 – Ecology & Biodiversity

ZOOL903E2 – Fisheries and Fish Technology

ZOOL903E3 – Reproductive Biology and Mol. Endocrinology

ZOOL1003E1 – Ecology & Biodiversity

ZOOL1003E2 – Fisheries and Fish Technology

ZOOL1003E3 – Reproductive Biology and Mol. Endocrinology

20/2/15

20/2/15

20/2/15

20.2.15

Head
Department of Zoology
Tripura University
Suryamaninagar

Proceeding of the First Meeting of the Board of Post Graduate Studies in Zoology

Date: 2nd & 3rd August 2016

Time: 12.30 PM – 4.30 PM

Venue: Seminar Hall, Zoology Department

Sl. No.	Name and Address of Members Present	Signature
1.	Prof. B.B. Jana, University of Kalyani, West Bengal	
2.	Prof. Jagat K. Roy, Banaras Hindu University, Varanasi	
3.	Prof. N. Saha, North – Eastern Hill University, Shillong	
4.	Prof. M.K. Singh, Dean, Faculty of Science, Tripura University	
5.	Prof. D. Ghosh, Department of Zoology, Tripura University	3.8.16
6.	Prof. S. Banik, Department of Zoology, Tripura University	
7.	Prof. P.S. Chaudhuri, Department of Zoology, Tripura University	3/8/16
8.	Dr. S. S. Singh, Department of Zoology, Tripura University	3/8/16
9.	Prof. A.K. Saha, Department of Botany, Tripura University	
10.	Dr. Dipayan Chaudhuri, Department of Human Physiology, Tripura University	03.08
11.	Prof. B. K. Agarwala, Head & ex-officio Chairperson	

1. **To welcome new members of the Board**

The Chairperson welcomed all the members to the first meeting of the BPGS. He expressed his gratitude to the external members, in particular, who took the trouble to travel to Agartala and for sparing their valuable time with us.

2. **To discuss and approve the revised syllabus of second, third and forth semesters in zoology under the CBC System**

Soft copies of the draft of syllabi were sent to all the members in advance and hard copies of the same were distributed in the meeting. All the members actively took part in finalizing the draft of the first, second, third and fourth semester syllabi and, after necessary improvements, approved the modified CBCS course lay out and syllabi of all four semesters in Zoology for implementation beginning from the first semester 2016 as per the rules of Tripura University. It was also resolved that the unmodified CBCS plan of course lay out in Zoology as approved by BOF (Science) will remain unchanged for the students of the 3rd semester 2016 and their further progress in to 4th semester 2017.

3. **To approve the Research Advisory Committees (RAC) of the following candidates enrolled for Ph.D.**

(I) Smt. Shilpa Dhar
(II) Smt. Sushmita Debnath
(III) Smt. Ruma Datta
(IV) Smt. Anandita Deb
(V) Smt. Sangita Sutradhar

As per the Ph.D. Regulation no. 5. 01. and 05. 02 of Tripura University, RACs of the following candidates are approved:

Sl. No.	Name of Student	RESEARCH ADVISORY COMMITTEE		
		External Member	Supervisor	Internal Member
1.	Smt. Shilpa Dhar	Prof. G. S. Solanki Department of Zoology, Mizoram University, Aizwal-796004	Prof.P.S. Chaudhuri	1. Prof. B. K. Agarwala 2. Prof. D. Ghosh 3. Prof. S. Banik
2.	Smt. Sushmita Debnath	Prof. G. S. Solanki Department of Zoology, Mizoram University, Aizwal- 796004	Prof.P.S. Chaudhuri	1.Prof. B. K. Agarwala 2. Prof. D. Ghosh 3. Prof. S. Banik
3.	Smt. Ruma Datta	Prof. Sumit Home Chaudhuri Deptt. of Zoology, University of Calcutta	Prof. P. S. Chaudhuri	1. Prof. B.K. Agarwala 2. Prof. D. Ghosh 3. Prof. S. Banik
4.	Smt. Anandita Deb	Prof. S. K. Maitra Deptt. of Zoology Viswa Bharati Santineketan – 731235, W.B	Prof. S.S. Singh (Supervisor) Prof. D. Ghosh (Co- Supervisor)	1.Prof. B. K. Agarwala 2. Prof. S. Banik 3. Prof. P.S. Chaudhuri
5.	Smt. Sangita Sutradhar	Prof. S. K. Maitra Deptt. of Zoology Viswa Bharati Santineketan – 731235, W.B	Prof. S.S. Singh (Supervisor) Prof. D. Ghosh (Co- Supervisor)	1.Prof. B. K. Agarwala 2. Prof. D. Ghosh 3. Prof. S. Banik
6.	Sri Partha Sarathi Nath	Proposal withdrawn by the Supervisor.		

4. **To approve the changes in Ph. D. Thesis titles of the following candidates based on the recommendations of the RACs as under:**

(i) Smt. Santa Ghosh
(ii) Smt. Aprajita Singh

As per the Ph.D. regulation no. 6.07, changes in the Ph. D. Thesis titles as proposed by the respective RACs of the candidates are approved:

S.L. No.	Name of student	Existing thesis title	Proposed change in thesis title
1.	Smt. Santa Ghosh	" Genital Morphology, Karyotyping and DNA Barcoding of some species of Coceinellini (Coleoptera: Coccinellidae) of Tripura, India"	" Genital Morphology, Biometry and DNA Barcoding of some species of Coceinellini (Coleoptera: Cocceinellidae) of Tripura, India"
2.	Smt. Aprajita Singh	"Biology and Aquaculture of Aar, *Aorichthys aor* (Hamilton, 1822) with reference to its conservation"	" Biology and Aquaculture of Aar, *Sperata aor* (Hamilton, 1822) with reference to its conservation"

5. **To approve the panel of Examiners and moderators for needful use in different examinations to be held during the Academic year:**

The list containing 35 names of proposed examiners and moderators from different University/ Institutes in India is approved for needful use by the Controller of Examinations for the M. Sc. end - Semester examinations in Zoology to be held during the year 2016 and 2017.

6. **To approve the Ph. D. Work plans of the following Candidates:**

(i) Smt. Shilpa Dhar
(ii) Smt. Sushmita Debnath

Ph.D. work plans of Smt. Shilpa Dhar and Smt. Sushmita Debnath, as recommended by the RACs, under the supervision of Prof. P.S. Chaudhuri are approved with necessary modifications.

7. **Any other items with the permission of the Chair**

(a) It was decided that the meeting of the full Board should be held at least once in an academic year to review and discuss the academic and research performances of the Department. However, infrequent meetings of the Board with quorum may be held as per the need.

The meeting ended with a vote of thanks to the Chair.

Prof. J.K. Roy
Banaras Hindu University

Prof. B.B. Jana
University of Kalyani

Prof. B.K. Agarwala
Head of the Department

Prof. S. Banik
Tripura University

Prof. D. Ghosh
Tripura University

Prof. N. Saha
North Eastern Hill University

Dr. Dipayan Choudhuri
Tripura University

Prof. A.K. Saha
Tripura University

Prof. P.S. Choudhuri
Tripura University

Dr. S.S. Singh
TU

NOTICE BOARD

8/3/17

Ph.D. Course Work Syllabus for Course Work -I

RESEARCH METHODOLOGY-I - Credit-4

The whole paper is divided into four units as follows:

Unit-1: Basic Computer Applications

Unit-2: Quantitative methods, Statistics and application of Computer in statistics

Unit-3: Research Ethics and IPR

Unit-4: Documentation and scientific writing

DETAILED SYLLABUS FOR EACH UNIT:

Unit-1: Basic Computer Applications

Basic computer knowledge, Features and applications related to presentation of text in suitable format and saving the data for future applications. Use of word processing, Practical knowledge of MS Word to type the script, insert tables, figures and graphs, plotting of graphs in excel, Preparation of power point presentations based on the topic of research. Insertion of figures, graphs, charts in presentation. Use of spreadsheet and database software, Preparation of scientific posters for presentations, Internet and its application: Email, WWW, Web browsing, acquiring technical skills, drawing inferences from data, Cloud computing.

Unit-2: Quantitative methods, Statistics and application of Computer in statistics

Measures of Central tendency and Dispersion. Probability distribution- Normal, Binomial and Poisson distribution. Parametric and Non-parametric statistics. Confidence interval, Errors. Quantitative Techniques: Levels of significance, Regression and Correlation coefficient. Statistical analysis and fitting of data; Chi-Square Test, Association of Attributes t-Test Anova, St andard deviation, Co-efficient of variations. Open source software for quantitative and statistical analysis.

Unit-3: Research Ethics and IPR

Environmental impacts - Ethical issues - ethical committees - Commercialization – Copy right – royalty - Intellectual property rights and patent law – Trade Related aspects of Intellectual Property Rights – Reproduction of published material – Plagiarism - Citation and acknowledgement - Reproducibility and accountability.

Unit-4: Documentation and scientific writing:

Results and Conclusions, Preparation of manuscript for Publication of Research paper, Presenting a paper in scientific seminar, Thesis writing. Structure and Components of Research Report, Types of Report: research papers, thesis, Research proposal, Research Project Reports, Pictures and Graphs, citation styles, writing a review of paper, Bibliography.

Approved

Syllabus Ph.D. Coursework in Zoology - 2017

Paper II: Research Methodology – II

(4 Credits: 100 Marks)

I. Review and Critics of Published Research in relevant field — *2 Credits: 50 Marks*

Review of published research work from among the following areas:

(i) Systematics and biodiversity
(ii) Ecology and biology
(iii) Invertebrate neuroendocrinology
(iv) Molecular endocrinology
(v) Proteins, enzymes and their genes in invertebrates
(vi) Fisheries and Aquaculture
(vii) Fisheries and Fish technology
(viii) Macroinvertebrate biology including insects and molluscs
(ix) Environmental pollutants and remediation techniques
(x) Tropical diseases

Each review will cover at least five original research articles published in last five years and are to be cited in the references.

AN OUTLINE PROFORMA OF THE REVIEW SHOULD BE GIVEN TO THE STUDENTS

40+10

II. Methodology of Research — *2 Credits: 50 Marks*

(i) Sampling methods of terrestrial and aquatic animals statistical methods
(ii) Use of Phase Contrast and Fluorescent Microscopes
(iii) Use of Electrophoresis system
(iv) Blotting Techniques
(v) DNA Barcoding and Phylogenetic analysis
(vi) Research design and sampling methods
(vii) Statistical methods in biology

(ii) through (v) can be clubbed as molecular techniques in biology.

For the points vi and vii above, the following books should be considered strictly

1] Zar JH. 1999. Biostatistical Analysis. IV edition. New Delhi, India: Pearson Education (Singapore) Pte. Ltd., Indian Branch, 663p + appendix

2] Holmes D, Moody P, Dine D. 2006. Research Methods for the Biosciences. , NewYork, USA: Oxford University Press377p

Head & Chairperson 11/3/17
Board of Post Graduate Studies
Department of Zoology
Tilpura University

Paper – III: Advances in Zoology

(4 Credits: 100 Marks)

1. **Biodiversity**
   - Importance, levels of biological diversity; Geographical scale of species diversity; Methods of measuring biodiversity in space and time, worked examples.

2. **Proteins and Enzymes**
   - Structural organizations in proteins.
   - Enzymes and mechanism of action. Purification of enzymes.
   - Characterization of Proteins and enzymes.

3. **Fish physiology, Biochemistry and Biotechnology**
   - Triploid fish- definition, factors stimulating and suppressing, technology for development of triploid fish; Trans-genesis in aquaculture;
   - Cryopreservation of fish gametes, ex-situ methods of conservation of germplasm, applications in aquaculture, sperm cryopreservation, cryopreserved milt and fertilization of eggs, ultra-structural studies on damages in cryopreserved spermatozoa, cryopreservation of fish embryos and embryonic stem cells.
   - Captive breeding- Genetic basis for Selection of fish for breeding, inbreeding effects, cross breeding and hybridization, selection and mating designs for select traits, selection for disease resistance, mono-sex, endocrine control of reproduction in fish, synchronization of spawning, brood-stock development and management, technology for preparation of aquaculture hapa, care of fertilized eggs, assessing stripping, induced normality and mortality; Carp fertilization and embryonic development- cleavage, blastula formation, gastrulation; Live feed development for larvae, larval feeding and maintenance, packaging and transport of carp post larvae, fry and fingerlings, nursery, rearing, pre-stocking technologies for carps.

4. **Earthworm Biology and Ecology**
   - Biology of reproduction in earthworms with reference to conjugation, cocoon formation and fecundity.
   - Neurobiology of tropical earthworms with reference to neurosecretion.
   - Earthworm as ecosystem engineers; Role of earthworms in soil fertility; edaphic factors controlling distribution of earthworms in soil; Vermiculture & Vermicomposting; Principle, method and significance of vermicomposting; Effect of vermicomposting on soil fertility.

5. **Molecular Endocrinology**
   - Hormone modern concept; types of receptors; cAMP and MAPK signalling pathway; hormonal control of gene expression; molecular basis of hormone synergism and antagonism.

11/3/17
Chairperson

Syllabus Ph.D. Coursework in Zoology - 2017

Paper IV: Seminar/ Practical / Project and Assessment

(4 Credits: 100 Marks)

1. **Project in the following areas of Zoology** *2 Credits: 50 Marks*
   - (i) Taxonomy and biodiversity
   - (ii) Ecology and biology
   - (iii) Invertebrate neuroendocrinology
   - (iv) Molecular endocrinology
   - (v) Proteins, enzymes and gene expression
   - (vi) Fisheries and Fish Technology
   - (vii) Aquaculture

Project on ~~any topic~~ other topic of Zoology and related field can also be allowed so that the student enjoys the freedom to select a topic of choice. For future the same topic may be used by the candidate for the Ph.D. programme.

2. Submission of Project Report, PPT presentation and viva-voce *2 Credits: 50 Marks*

11/3/17

Head & Chairperson
Board of Post Graduate Studies
Department of Zoology
Tripura University