B.Sc. ZOOLOGY

SYLLABUS

(I – II Semester)

FROM THE ACADEMIC YEAR

2026-2027 onwards

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1. COURSE OBJECTIVES

- To provide students with a comprehensive understanding of Zoology, including current trends, modern practices in Biology, and the diversity and status of animal life.
- To design and restructure the curriculum in a skill-oriented and job-focused manner, enabling students to meet emerging career opportunities.
- To equip students with the knowledge and competencies required to face competitive examinations and pursue higher studies and professional careers successfully.
- To inculcate scientific temperament, research aptitude, and awareness of recent developments in Zoological Sciences among undergraduate students.
- To facilitate effective access to digital resources and e-learning platforms for continuous and self-directed learning.
- To enhance the academic and practical standards of students and bring them on par with national and international benchmarks in Biological Sciences.

2. ELIGIBILITY FOR ADMISSION

Candidates who have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamil Nadu, or examinations of CBSE, ICSE, or any other equivalent Board recognized by the Syndicate of Manonmaniam Sundaranar University, with Chemistry, Biology, Zoology, Microbiology, Biochemistry, or Agriculture as one of the subjects under Part III, are eligible for admission to the B.Sc. Zoology programme.

3. DURATION OF THE PROGRAMME

The prescribed course of study shall extend over a period of three academic years comprising six semesters. Each semester shall consist of 90 working days.

4. MINIMUM REQUIREMENTS FOR THE AWARD OF THE DEGREE

Candidates must secure a minimum of 35 marks in each course to pass that particular course. Candidates must pass in all courses prescribed for the programme. Candidates who have earned 140 credits and above shall be awarded the B.Sc. Degree.

5. PROGRAMME OUTCOMES (PO)

After the successful completion of Undergraduate Programme from the University, the
learner should be able to

PO1: Comprehend the knowledge acquired and communicate the same to others.

PO2: Analyze and compare the factual data / situation to comprehend and to critically evaluate to find solution to the problem ahead.

PO3: Apply theories and philosophies learned in solving the problem in scientific manner.

PO4: Think reflectively on the earlier activities and attempt for self directed lifelong learning process.

PO5: Understand multicultural existence and identify the means to prolong moral/ ethical values in personal and professional life.

PO6: Explore through multiple sources and get exposed to the digital technology.

PO7: Act as a responsible member in teams and practice leadership qualities.

6. PROGRAMME SPECIFIC OUTCOMES (PSO)

After the successful completion of the B.Sc. Zoology programme, the learner will be able to:

PSO1: Acquire comprehensive knowledge of animal diversity, taxonomy, anatomy, physiology, genetics, evolution, ecology, and applied zoology.

PSO2: Demonstrate practical skills in laboratory techniques, specimen identification, microscopy, dissection, histology, and biological data analysis.

PSO3: Analyze biological and environmental problems critically and apply scientific methods to propose suitable solutions related to animal and human welfare.

PSO4: Apply zoological concepts in interdisciplinary fields such as biotechnology, aquaculture, sericulture, apiculture, poultry science, environmental management, and public health.

PSO5: Utilize digital tools, bioinformatics resources, and modern technologies for scientific learning, research, documentation, and communication.

PSO6: Develop research aptitude, scientific temper, leadership qualities, teamwork, and self-directed lifelong learning through projects, field visits, and extension activities.

PSO7: Practice ethical values, social responsibility, and environmental consciousness for biodiversity conservation and sustainable use of natural resources.

7. EXAMINATION AND EVALUATION MECHANISM

a) Theory Examination

There shall be a minimum pass requirement of 40% in the University Examination for each theory course in the UG programme.

b) Distribution of Marks for Theory Courses

The total marks for theory courses shall be 100, distributed as follows:

Internal Assessment : 25 Marks
External Examination : 75 Marks

c) Internal Assessment for Theory Courses

The Internal Assessment shall consist of the following components:
Tests – 20 Marks. (Three compulsory tests shall be conducted. The average of the best two tests shall be considered for evaluation.
Assignment – 5 Marks
Total Internal Assessment Marks: 25

d) Scheme of External Examination

3 hrs. Examination at the end of the Semester.
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

e) Practical Examination

The total marks for practical courses shall be 100, distributed as follows:

Internal Evaluation – 50 Marks. (Continuous Internal Assessment Tests, Major and Minor Dissection, Mounting, Record Work, Attendance and Class Participation)
External Evaluation – 50 Marks. (End Semester University Practical Examination)

Total: 100 Marks

f) Field Work / Internship / Industrial Training

a. Students shall undergo a minimum of 30 hours of Field Work / Internship / Industrial Training.
b. A report shall be submitted during the University Practical Examination.
c. Evaluation Scheme: Internal Evaluation : 50 Marks, External Evaluation : 50 Marks
d. The external examiner shall evaluate the external component of 50 marks.

g) Project Work

a. The Project shall carry 100 marks and shall be evaluated as follows:
b. The project shall be undertaken in groups consisting of 4–6 students.
c. The Group Project Report shall be submitted at the end of the Fifth Semester during the practical examination.
d. The Project Report shall contain a minimum of 25 pages and a maximum of 100 pages.
e. Evaluation Scheme: Internal Evaluation : 50 Marks, External Evaluation : 50 Marks
f. The external examiner shall evaluate the external component of 50 marks.

8. PROGRAMME STRUCTURE

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Credit Distribution for UG Programme (2024-2025)

Sem-1	C	H	Sem-II	C	H	Sem-III	C	H	Sem-IV	C	H	Sem- V	C	H	Sem-VI	C	H
Part-1: **Tamil /Language**	**3**	**6**	Part-1: **Tamil /Language**	**3**	**6**	Part-1**:** **Tamil /Language**	**3**	**6**	Part-1: **Tamil /Language**	**3**	**6**	Part-3: **5.1 Core Course- CC IX**	**4**	**5**	Part-3: **6.1 Core Course- CC XIII**	**4**	**6**
Part-2: **English**	**3**	**6**	Part-2: **English**	**3**	**4**	Part-2**:** **English**	**3**	**6**	Part-2**:** **English**	**3**	**6**	Part-3: **5.2 Core Course- CC X**	**4**	**5**	Part-3: **6.2 Core Course- CC XIV**	**4**	**6**
Part-3: **1.3 Core Course- CC I**	**5**	**5**	Part-3: **2.3 Core Course- CC III**	**5**	**5**	Part-3: **3.3 Core Course- CC V**	**4**	**4**	Part-3: **4.3 Core Course- CC VII**	**4**	**4**	Part-3: **5.3 Core Course- CC XI (Lab)**	**3**	**4**	Part-3: **6.3 Core Course- CC XV (Lab)**	**3**	**4**
Part-3: **1.4 Core Course- CC II (Lab)**	**3**	**3**	Part-3: **2.4 Core Course- CC IV (Lab)**	**3**	**3**	Part-3: **3.4 Core Course- CC VI (Lab)**	**2**	**2**	Part-3: **4.4 Core Course- CC VIII (Lab)**	**2**	**2**	Part-3: **5.4 Core Course / Project with Viva Voce - CC XII**	**5**	**4**	Part-3: **6.4 Elective VII / Discipline Specific**	**3**	**5**
Part-3: **1.5 Elective I / Discipline Specific**	**5**	**6**	Part-3: **2.5 Elective II / Discipline Specific**	**5**	**6**	Part-3: **3.5 Elective III / Discipline Specific**	**5**	**6**	Part-3: **4.5 Elective IV / Discipline Specific**	**5**	**6**	Part-3: **5.5 Elective V / Discipline Specific**	**3**	**4**	Part-3: **6.5 Elective VIII / Discipline Specific**	**3**	**5**
Part-4: **1.6 Skill Enhancement Course – SEC-1**	**2**	**2**	Part-4: **2.6 Skill Enhancement Course – SEC-2**	**1**	**2**	Part-4: **3.6 Skill Enhancement Course – SEC-4**	**1**	**2**	Part-4: **4.6 Skill Enhancement Course – SEC-5**	**1**	**2**	Part-3: **5.6 Elective VI / Discipline Specific**	**3**	**4**	Part-3: **Elective Lab VI: Elective VII & Elective VIII**	**2**	**2**
Part-4: **1.7 Foundation Course**	**2**	**2**	Part-4: **2.7 Skill Enhancement Course – SEC-3**	**1**	**2**	Part-4: **3.7 Naan Mudhalvan Course-2**	**2**	**2**	Part-4: **4.7 Naan Mudhalvan Course-3**	**2**	**2**	Part-3: **5.7 Elective Lab V: Elective V & Elective VI** Part-4: **5.8 Internship / Industrial Visit / Field Visit / Knowledge updation activity**	**2** **2**	**2** **-**	Part-5: **6.6 Extension Activity (NSS / NCC / YRC / RRC / Sports / Youth Welfare activities)**	**1**	**-**
			Part-4: **2.8 Naan Mudhalvan Course-1** *(by English)*	**2**	**2**	Part-4: **3.8 E.V.S**	**2**	**2**	Part-4: **4.8 Value Education**	**2**	**2**	Part-4: **5.8 Naan Mudhalvan Course-4**	**2**	**2**	Part-4: **6.7 Naan Mudhalvan Course-5**	**2**	**2**
	23	**30**		**23**	**30**		**22**	**30**		**22**	**30**		**28**	**30**		**22**	**30**
Total – 140 Credits																	

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System for all UG courses including Lab Hours

B.Sc Zoology

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses [in Total]	13	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
		23	**30**

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	4
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-2 (Discipline / Subject Specific)	1	2
	Skill Enhancement Course -SEC-3 (Discipline / Subject Specific)	1	2
	Naan Mudhalvan Course-1 *(Handled by English Dept.)*	2	2
		23	**30**

Second Year – Semester-III

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	11	12
Part-4	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	2
	Naan Mudhalvan Course-2	2	2
	E.V.S	2	2
		22	**30**

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	11	12
Part-4	Skill Enhancement Course -SEC-5 (Discipline / Subject Specific)	1	2
	Naan Mudhalvan Course-3	2	2
	Value Education	2	2
		22	**30**

Third Year
Semester-V

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based	26	28
Part-4	Naan Mudhalvan Course-4	2	2
	Internship / Industrial Visit / Field Visit / Knowledge updation activity	2	-
		28	**30**

Semester-VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based & LAB	19	28
Part-4	Extension Activity	1	-
	Naan Mudhalvan Course-5	2	2
		22	**30**

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	11	11	24	19	91
Part IV	4	4	5	5	4	2	26
Part V	-	-	-	-	-	1	1
Total	23	23	22	22	28	22	**140**

***Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	**Foundation Course** To ease the transition from higher secondary to higher education by introducing the pedagogy of learning abstract statistical concepts and their real-world applications.	• Instils confidence among students. • Creates interest in the subject • Enhances conceptual understanding of Statistics and Mathematics. • Bridges the gap between school and higher education learning methods
I, II, III, IV	**Skill Enhancement papers** (Discipline centric / Generic / Entrepreneurial)	• Produces industry-ready graduates • Develops skilled human resources • Enhances employability through essential practical skills • Provides training in computing and computational techniques • Develops data analytical and interpretation skills • Facilitates internships, apprenticeships, and field-based learning • Encourages entrepreneurship and self-employment • Promotes small-scale entrepreneurial ventures • Contributes to women empowerment through skill-based training • Improves technical expertise in solving real-life problems using ICT tools
III, IV, V & VI	**Elective papers-** An open choice of topics categorized under Generic and Discipline Centric	• Strengthens domain knowledge • Introduces multidisciplinary, interdisciplinary, and cross-disciplinary approaches • Exposes students to state-of-the-art techniques and emerging technologies • Enhances knowledge in Computer Science, IT, and allied statistical applications • Introduces applications in health, communication, industry, and research sectors • Provides hands-on training in statistical modelling and data-driven decision-making
II year Vacation activity	**Internship / Industrial Training**	• Provides practical exposure in industries, banking, educational institutions, and public/private sectors • Enhances professional competence and

		workplace readiness. • Develops communication, teamwork, and ethical responsibility. • Encourages responsible citizenship and professional discipline.
V Semester	**Project** with Viva – voce	• Promotes self-learning and independent study • Enhances research aptitude and analytical thinking • Enables application of theoretical concepts to real-life situations • Produces tangible academic and practical outcomes • Improves presentation and viva-voce skills
VI Semester	Introduction of Professional Competency Component / Naan Mudhalvan	• Accommodates learners of varied abilities and career aspirations • Provides advanced statistical knowledge for research-oriented students • Supports preparation for competitive examinations such as UPSC, ISS, CDS, NDA, Banking, CAT, and TNPSC • Enhances professional competency and career readiness • Strengthens aptitude, reasoning, and communication skills
Extra Credits: **For Advanced Learners / Honors degree**		• Caters to peer learners and research aspirants • Encourages academic excellence and advanced learning • Provides opportunities for research orientation and specialization • Enhances prospects for higher education and professional careers

MAPPING OF COS WITH POS

CO-PO MAPPING (COURSE ARTICULATION MATRIX)
CO - Core Course (Theory), SEC – Skill Enhancement Course, FC – Foundation course,

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7
Invertebrata	CO1	3	3	2	3	1	2	1
Ornamental Fish Farming and Management	SEC-1	2	3	3	2	3	2	3
Introduction to Zoology	FC	3	2	2	3	2	1	1
Lab on Invertebrata	CO2	2	3	3	2	1	2	2
Chordata	CO3	3	3	2	2	2	1	1
Bio Composting for Entrepreneurship	SEC-2	2	2	3	2	3	2	3
Animal Behaviour	SEC-3	3	3	2	3	2	2	2
Lab on Chordata	CO4	2	3	3	2	1	2	2
Cell Biology	CO5							
Lab on Cell Biology	CO6							
Economic Zoology / Medical Laboratory Techniques	SEC-4							
Genetics and Evolution	CO7							
Lab on Genetics and Evolution	CO8							
Basics of Marine Biology / Wildlife Conservation and Management	SEC-5							
Animal Physiology and Biochemistry	CO9							
Environmental Biology	CO10							
Lab on Animal Physiology and Biochemistry & Environmental Biology	CO11							
PROJECT / Food, Nutrition and Health	CO12							
Biostatistics and Computer Application	CO13 – Elective I							
Agricultural Entomology / Sericulture / Vermitechnology	CO14 – Elective II							
Lab on Biostatistics and Computer Application & Elective -II	CO15							

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Developmental Biology	CO16							
Microbiology and Immunology	CO17							
Lab on Developmental Biology & Microbiology and Immunology	CO18							
Animal Biotechnology and Bioinformatics	CO19 – Elective III							
Applied Zoology / Apiculture / Aquaculture	CO20 – Elective IV							
Lab on Animal Biotechnology and Bioinformatics & Elective IV	CO21							

Level of correlation between COs and POs
0 – No Correlation 1 – Low 2 – Medium 3- High

MAPPING OF COs WITH PSOs

CO-PSO MAPPING (COURSE ARTICULATION MATRIX)
CO - Core Course (Theory), SEC – Skill Enhancement Course, FC – Foundation course,

CO		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
Invertebrata	CO1	3	2	2	2	1	2	2
Ornamental Fish Farming and Management	SEC-1	2	2	2	3	2	2	2
Introduction to Zoology	FC	3	2	2	2	1	1	2
Lab on Invertebrata	CO2	2	3	2	1	2	2	1
Chordata	CO3	3	2	2	2	1	1	2
Bio Composting for Entrepreneurship	SEC-2	2	2	3	3	2	2	3
Animal Behaviour	SEC-3	3	1	3	3	1	2	2
Lab on Chordata	CO4	2	3	2	1	2	2	1
Cell Biology	CO5							
Lab on Cell Biology	CO6							
Economic Zoology / Medical Laboratory Techniques	SEC-4							
Genetics and Evolution	CO7							
Lab on Genetics and Evolution	CO8							
Basics of Marine Biology /	SEC-5							

Wildlife Conservation and Management								
Animal Physiology and Biochemistry	CO9							
Environmental Biology	CO10							
Lab on Animal Physiology and Biochemistry & Environmental Biology	CO11							
PROJECT / Food, Nutrition and Health	CO12							
Biostatistics and Computer Application	CO13 – Elective I							
Agricultural Entomology / Sericulture / Vermitechnology	CO14 – Elective II							
Lab on Biostatistics and Computer Application & Elective -II	CO15							
Developmental Biology	CO16							
Microbiology and Immunology	CO17							
Lab on Developmental Biology & Microbiology and Immunology	CO18							
Animal Biotechnology and Bioinformatics	CO19 – Elective III							
Applied Zoology / Apiculture / Aquaculture	CO20 – Elective IV							
Lab on Animal Biotechnology and Bioinformatics & Elective IV	CO21							

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9. COURSE CONTENT

B.SC., ZOOLOGY

Induction of Naam Mudhalvan Course in II semester onwards for those joined in the academic year 2026-27 onwards.

First Year Semester – I

Part	List of Courses	Credit	No. of Hours per week
Part-1	**Language** – Tamil / Other Languages	3	6
Part-2	**English**	3	6
Part-3	Core Course I: **Invertebrata** Core Lab Course I: **Lab on Invertebrata** Allied -I (Generic /Discipline Specific): **Allied Botany I /** **Industrial Fish and Fisheries-I Biology of fish** Allied Lab Course -I: **Lab on Allied Botany /** **Industrial Fish Fisheries-I Biology of Fish**	5 3 3 2	5 3 4 2
Part-4	Skill Enhancement Course – SEC-I: **Ornamental Fish Farming and Management**	2	2
	Foundation Course: **Introduction to Zoology**	2	2
	Total	**23**	**30**

First Year Semester – II

Part	List of Courses	Credit	No. of Hours per week
Part-1	**Language** – Tamil / Other Languages	3	6
Part-2	**English**	3	4
Part-3	Core Course 2: **Chordata** Core Lab Course II: **Lab on Chordata** Allied -II (Generic /Discipline Specific): **Allied Botany II /** **Industrial Fish and Fisheries-II Biology of fish** Allied Lab Course: Elective-II- **Lab on Allied Botany II /** **Lab on Industrial Fish Fisheries-II Biology of Fish**	5 3 3 2	5 3 4 2
Part-4	Skill Enhancement Course – SEC-2: **Bio Composting for Entrepreneurship**	1	2
	Skill Enhancement Course – SEC-3: **Animal Behaviour**	1	2
	Naan Mudhalvan Course-1: Language Proficiency for Employability- Overview of English Communication*- Cambridge (Handled by English)	2	2
	Total	**23**	**30**

Second Year Semester – III

Part	List of Courses	Credit	No. of Hours per week
Part-1	**Language** – Tamil / Other Languages	3	6
Part-2	**English**	3	6
Part-3	Core Course 3: **Cell Biology** Core Lab Course III: **Lab on Cell Biology** Allied -III (Generic /Discipline Specific): **Chemistry for Biological Sciences-I** Allied -III Lab Course: **Volumetric Analysis**	4 2 3 2	4 2 4 2
Part-4	Skill Enhancement Course – SEC-4: **Economic Zoology / Medical Laboratory Techniques**	1	2
	Naan Mudhalvan Course-2 (Poultry Science and Management*) ** Substitute paper exclusively for reappearance only*	2	2
	E.V.S	2	2
	Total	**22**	**30**

Second Year Semester – IV

Part	List of Courses	Credit	No. of Hours per week
Part-1	**Language** – Tamil / Other Languages	3	6
Part-2	**English**	3	6
Part-3	Core Course 4: **Genetics and Evolution** Core Lab Course IV: **Lab on Genetics and Evolution** Allied -IV (Generic /Discipline Specific): **Chemistry for Biological Sciences - II** Allied IV Lab Course: **Systematic Analysis of Organic Compounds.**	4 2 3 2	4 2 4 2
Part-4	Skill Enhancement Course – SEC-5: **Basics of Marine Biology /** **Wildlife Conservation and Management**	1	2
	Naan Mudhalvan Course-3 (Basic Course in Ornithology*) ** Substitute paper exclusively for reappearance only*	2	2
	Value Education	2	2
	Total	**22**	**30**

Third Year Semester – V

Part	List of Courses	Credit	No. of Hours per week
Part-3	Core Course 5: **Animal Physiology and Biochemistry** Core Course 6: **Environmental Biology**	4 4	5 5

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	Core Lab Course V: **Lab on Animal Physiology and Biochemistry & Environmental Biology**	3	4
	Core Course 7: **PROJECT / Food, Nutrition and Health**	5	4
	Core Course 8: Elective-I (Generic /Discipline Specific): **Biostatistics and Computer Application**	3	4
	Core Course 9: Elective-II (Generic /Discipline Specific): **Agricultural Entomology / Sericulture / Vermitechnology**	3	4
	Core Lab Elective Course VI : **Lab on Biostatistics and Computer Application, & Elective -II**	2	2
Part-4	Internship / Industrial Visit / Field Visit / Knowledge updation activity	2	0
	Naan Mudhalvan Course-4 (Basics of Marine Biology*) * *Substitute paper exclusively for reappearance only.*	2	2
	Total	**28**	**30**

Third Year Semester – VI

Part	List of Courses	Credit	No. of Hours per week
Part-3	Core Course 10: **Developmental Biology**	4	6
	Core Course 11: **Microbiology and Immunology**	4	6
	Core Lab Course VII: **Lab on Developmental Biology & Microbiology and Immunology**	3	4
	Core Course 12 Elective-III (Generic /Discipline Specific): **Animal Biotechnology and Bioinformatics**	3	5
	Core Course 13 Elective-IV (Generic /Discipline Specific): **Applied Zoology / Apiculture / Aquaculture**	3	5
	Core Lab Elective Course VIII : **Lab on Animal Biotechnology and Bioinformatics, & Elective -IV**	2	2
Part-4	**Naan Mudhalvan Course-5** (Aquarium Keeping*) * *Substitute paper exclusively for reappearance only.*	2	2
Part-5	Extension Activity (NSS / NCC / YRC / RRC / Sports / Youth Welfare activities)	1	-
	Total	**22**	**30**

B.Sc Zoology

First Year Semester – I

Part	List of Courses	Credit	No. of Hours per week
Part-1	**Language** – Tamil / Other Languages	3	6
Part-2	**English**	3	6
Part-3	Core Course 1: **Invertebrata** Core Lab Course I: **Lab on Invertebrata** Allied -I (Generic /Discipline Specific): **Allied Botany I /** **Industrial Fish and Fisheries-I Biology of fish** Allied Lab Course -I: **Lab on Allied Botany /** **Industrial Fish Fisheries-I Biology of Fish**	5 3 3 2	5 3 4 2
Part-4	Skill Enhancement Course – SEC-I: **Ornamental Fish Farming and Management**	2	2
	Foundation Course: **Introduction to Zoology**	2	2
	Total	**23**	**30**

SEMESTER – I

CORE COURSE - CO1: INVERTEBRATA

Course Code **CC1**	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	INVERTEBRATA	Core	Y	-	-	-	5	5	25	75	100

Course outcomes	
CO1	Understand the basic concepts of lower animals and observe their structure and functions.
CO2	Illustrate and examine the systematic and functional morphology of various groups of invertebrates
CO3	Differentiate and classify the various groups of animals based on modes of life and estimate biodiversity.
CO4	Compare and distinguish the general and specific characteristic of reproduction in lower animals
CO5	Infer and integrate the parasitic and economic importance of invertebrate animals

UNIT	**Details**	**No of Hours**
I	**Protozoa**: Introduction to Classification, taxonomy and nomenclature. General characters and classification of Phylum Protozoa up to classes. Type study: *Paramecium* - Parasitic protozoans (*Entamoeba*,	12

	Trypanosoma & *Leishmania*) - Nutrition in protozoa - Host-parasitic interactions in *Entamoeba* and *Plasmodium* - Locomotion in protozoa	
II	**Porifera**: General characters and classification up to Classes. Type study: Sycon- Canal system in sponges. Reproduction in sponges **Coelenterata:** General characters and classification up to classes – Type study: *Obelia* - Corals and coral reefs - Economic importance of corals and coral reefs - Polymorphism in Hydrozoa.	12
III	**Platyhelminthes:** General characters and classification of up to classes. Type study: *Fasciola hepatica*. Parasitic adaptations. **Aschelminthes** : General characters and classification of up to classes - Type study: *Ascaris lumbricoides.* Nematode Parasites and diseases - *Wuchereria bancrofti*, *Enterobius vermicularis*, *Ancylostoma duodenale*. - Parasitic adaptations.	12
IV	**Annelida:** General characters and classification up to Classes. Type study: *Nereis,* - Metamerism - Modes of life in Annelids. **Arthropoda:** General characters and classification of Phylum Arthropoda up to Classes. Detailed study: *Penaeus indicus*. Affinities of *Peripatus* – Larval forms in Crustacea.	12
V	**Mollusca:** General characters and classification of Phylum Mollusca up to Classes. Detailed study: *Pila globosa*. Foot and torsion in Mollusca. Economic importance of Cephalopods. **Echinodermata:** General characters and classification of Phylum Echinodermata up to Classes. Detailed study: *Asterias.* Water vascular system in Echinodermata – Larval forms of Echinoderms.	12
	Total	**60**
Text Books (Latest Editions)		
1	Ekambaranatha Iyer, 2000. *A Manual of Zoology*, 10th edition, Viswanathan, S., Printers & Publishers Pvt Ltd	
2	Jordan, E.L. and Verma P.S, 1995. *Invertebrate Zoology*, 12th edn. S. Chand& Co.	
3	Kotpal, R.L, 1992. *Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca, Echinodermata.*	
Reference Books (Latest editions, and the style as given below must be strictly adhered to)		
1	Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.	
2	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science	
3	Barrington, E.J.W. (1979). *Invertebrate Structure and Functions*, II Edition, E.L.B.S. and Nelson	
4	Hyman L.H, 1955. The invertebrates - Vol. I to Vol. VII – Mc Graw Hill Book Co.	
5	Parker, J. and Haswell , 1978. *A text book of Zoology Vol. I* - Williams and Williams.	
Web Resources		
1	https://www.nationalgeographic.com/animals/invertebrates/	
2	https://www.britannica.com/science/parasitic-disease	

3	https://www.nio.res.in/
4	https://greatbarrierreef.org/

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	1	2	1	1	1
CO 2	3	3	2	2	1	1	1
CO 3	2	3	2	2	2	1	2
CO 4	2	2	2	3	1	1	1
CO 5	2	2	3	2	3	2	2
Total Score	12	12	10	11	8	6	7

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	1	1	1	1	1
CO 2	3	3	2	2	1	1	1
CO 3	2	3	2	2	2	1	2
CO 4	2	2	2	3	1	1	1
CO 5	2	2	3	2	3	2	2
Total Score	12	12	10	10	8	6	7

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

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SEMESTER – I

CORE COURSE - CO2: LAB ON INVERTEBRATA

Course Code **CC2**	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	LAB ON INVERTEBRATA	Core	Y	-	-	-	3	3	50	50	100

Course Outcomes	
CO1	To dissect and mount various body parts and to study the various functional details of invertebrates.
CO2	To understand the organs, organ system and their functions in lower animals
CO3	To dissect and mount various body parts and to study the various functional details of chordates.
CO4	To identify the different groups of invertebrate animals by observing their external characteristics.
CO5	To identify the different groups of Invertebrates to gather adequate knowledge and to record.

UNIT	**Details**		**Course Objectives**
I	**Dissection**: 1. Cockroach: Nervous system 2. Cockroach: Reproductive system		CO1
II	**Dissection:** **3.** Cockroach: Digestive system		CO2
III	**Mounting:** 1. Mouth Parts – Cockroach 2. Mouth Parts - Honey bee, Mosquito 3. Prawn appendages 4. Earth worm – body setae, penial setae (Demo)		CO3
IV	**Spotters: (i). Protozoa:** Amoeba, Paramoecium, Paramoecium Binary fission and Conjugation, Entamoeba histolytica, Plasmodium vivax **(ii). Porifera:** Sycon **(iii). Coelenterata:** Obelia – Colony & Medusa, Aurelia, Physalia, Gorgonia, **(iv). Platyhelminthes:** Planaria, Fasciola hepatica, Fasciola larval forms – Redia, Cercaria, Taenia solium, **(v). Nemathelminthes:** Ascaris (Male & Female), **vi). Annelida:** Nereis, Chaetopteurs, **(vii). Arthropoda:** Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, , Larvae - Nauplius, Mysis, Zoea,. **(viii). Mollusca:** Chiton, Pila, Unio,—Sepia, Octopus, **(ix). Echinodermata:** Asterias, Ophiothrix, Cucumaria, Bipinnaria larva		CO4
V	Record / Observation Note		CO5

	(SUBMISSION IS MANDATORY)		
Text Books (Latest Editions)			
1	Ekambaranatha Iyyar and T. N. Ananthakrishnan, 1995 *A manual of Zoology Vol.I* (Part 1, 2) S. Viswanathan, Chennai		
2	Ganguly, Sinha an d Adhikari , 2011 . *Biology of Animals: Volume I,* New Central Book Agency; 3rd revised edition. 1008 pp.		
3	Sinha, Chatterjee and Chattopadhyay, 2014. *Advanced Practical Zoology*, Books & Allied Ltd; 3rd Revised edition, 1 07 0 pp.		
4	Lal ,S. S, 2016 . *Practical Zoology Invertebrate*, Rastogi Publications.		
5	Verma, P. S. 2010. A Manual of Practical Zoology: Invertebates, S Chand, New Delhi		
Reference Books (Latest editions, and the style as given below must be strictly adhered to)			
1	Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science		
2	Barnes, R.D. (1982). *Invertebrate Zoology,* V Edition. Holt Saunders International Edition.		
3	Barrington, E.J.W. (1979). *Invertebrate Structure and Functions. II Edition,* E.L.B.S. and Nelson		
4	Boradale, L.A. and Potts, E.A. (1961). *Invertebrates: A Manual for the use of Students*. Asia Publishing Home.		
5	Lal, S.S. 2005. *A text Book of Practical Zoology*: Invertebrate, Rastogi, Meerut		
Web Resources			
1	https://nbb.gov.in/		
2	https://www.agshoney.com/training.htm		
3	https://icar.org.in/		
4	https://nisa.icar.gov.in/		
5	https://www.nationalgeographic.com/animals/invertebrates/		

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	3	2	1	1	2
CO 2	3	3	3	2	1	2	1
CO 3	3	2	3	2	1	1	2
CO 4	3	3	2	2	2	1	1
CO 5	2	2	2	3	2	2	2
Total Score	14	12	13	11	7	7	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3	2	1	2	2	1
CO 2	3	3	3	2	1	1	1
CO 3	3	3	2	2	1	2	1
CO 4	3	3	2	2	2	1	2
CO 5	2	2	2	1	2	3	2
Total Score	14	14	11	8	8	9	7

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

SEMESTER – I PART – IV

Skill Enhancement Course – SEC-1

ORNAMENTAL FISH FARMING AND MANAGEMNT

Hours: 2 Credit- 2

COURSE OUTCOMES

Students will able to

CO1 Explain the scope and importance of ornamental fish culture and identify commercially important ornamental fishes

CO2 Describe breeding biology and demonstrate hatchery and nursery management techniques of ornamental fishes.

CO3 Apply knowledge of aquarium plant propagation and feeding practices in ornamental fish culture.

CO4 Analyse aquarium management practices and evaluate disease prevention and control measures

CO5 Assess marketing strategies, economic and export potential of ornamental fish farming for entrepreneurship development

Unit I:

Introduction to ornamental fish keeping: Scope and importance of ornamental fish culture. Identification of commercially important ornamental fishes - Indigenous and exotic varieties.

Unit II:

Biology of egg layers and live bearers: Breeding, hatchery and nursery management of egg layers (eg. Goldfish) and live bearers (eg.Guppy).

Unit III:

Aquarium plants and their propagation: Food and feeding in ornamental fishes. Formulated feed and Live feed; Live feed culture. Identification of locally available live feed organisms.

Unit IV:

Aquarium design and construction: Accessories - aerators, filters and lighting Maintenance of aquarium and water quality management. Ornamental fish diseases, their prevention, control and treatment methods.

Unit V:

Conditioning, packing, transport and quarantine methods. Economics, trade regulations, domestic and global export potential and marketing strategies.

References:

1. Swain SK., Sarangi N. and Ayyappan S. (2010). *Ornamental fish farming*. ICAR, New Delhi.
2. *Living Jewels – A handbook on freshwater ornamental fish*, (1999) MPEDA, Kochi.
3. Dey V.K.A. (1997). *A handbook on aquafarming ornamental fishes*. MPEDA, Kochi.
4. Ahilan, B., Felix N. and Santhanam R. (2008), *Text book of aquariculture*. Daya Publishing House, New Delhi.

Web Resources

1. http://ecoursesonline.iasri.res.in/course/view.php?id=297
2. https://www.ofish.org/
3. https://krishijagran.com/agripedia/income-generation-by-ornamental-fish-culture/
4. https://99businessideas.com/ornamental-fish-farming/

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	1	1	1	2	2
CO 2	2	2	3	2	2	2	2
CO 3	2	2	3	2	3	2	2
CO 4	2	3	2	3	2	3	2
CO 5	2	3	2	2	2	3	3
Total Score	11	12	11	10	10	12	11

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	1	1	2	1	2
CO 2	2	3	2	2	2	2	2
CO 3	2	2	3	2	3	2	2
CO 4	2	3	2	3	2	3	2
CO 5	2	2	3	3	3	3	3
Total Score	11	12	11	11	12	11	11

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

SEMESTER – I PART – IV

Foundation course

INTRODUCTION OF ZOOLOGY

Hours: 2 Credit- 2

Course outcomes

COI : Identify and understand the diversity of animals, taxonomic hierarchy, and classification systems in zoology.

CO2:Explain the structure and functions of cells, principles of inheritance, and molecular basis of life.

CO3:Describe the importance of biomolecules and physiological systems in maintaining life processes.

CO4:Analyze environmental components, developmental processes, and evolutionary concepts related to origin of life.

CO5: Recognize the scope and applications of entrepreneurial fields in zoology and their role in sustainable development.

UNIT 1:

Animal Biodiversity and Systematics: Taxonomic hierarchy: Classification of animal kingdom- Two kingdoms and Five kingdom classification- Binomial nomenclature- Different phyla of animal kingdom.

UNIT 2:

Cell Biology & Genetics: Cell theory- Ultrastructure of a typical Prokaryotic and Eukaryotic cell. General Account on Mendelism and inheritance- DNA and RNA- Central dogma of Molecular Biology.

UNIT 3:

Biochemistry and Physiology: Introduction to the role of essential biological Compounds- of Proteins, Carbohydrates and Lipids. Introduction to organ system of vital physiological functions.

UNIT 4:

Environmental Biology: Basics of atmosphere and components of ecosystem. **Developmental Biology:** General account of gametogenesis- fertilization and developmental stages. **Evolution:** Origin of life – Darwinism.

UNIT 5:

Entrepreneurial Courses in Zoology: General introduction and applications: Aquaculture - Aquarium keeping - Apiculture - Sericulture - Vermiculture - Poultry keeping- Dairy farming- Biotechnology-Ecotourism.

References:

1. Ekambaranatha Iyer, (2000), *A Manual of Zoology*, 10th edition, Viswanathan, S., Printers & Publishers Pvt Ltd
2. Jordan, E.L. and Verma P.S, (1995), *Invertebrate Zoology*, 12th edn. S. Chand& Co.
3. Kotpal, R.L.(2019), *Modern text book of Zoology: Invertebrates*. Rastogi Publication, New Delhi.
4. Kotpal (2015). *Modern Textbook of Zoology Vertebrates*, Rastogi publishers, New Delhi.
5. H.C, Nigam. (2010), *Biology of Chordates*., Vishal Publications, New Delhi

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6. Gupta. P.K., (2017), *Cell and Molecular Biology,* Fifth Revised Edition, Rastogi Publication, Meerut, India.
7. Singh. H.R, & Neeraj Kumar (2017), *Animal Physiology and Biochemistry*, Vishal Publishing Co.
8. Erach Bharucha. (2005). *Text book of Environmental Studies for undergraduate courses*, University Grants Commission, New Delhi.
9. Shukla, G.S. & Upadhyay, V.B. (2014). *Applied and Economic Zoology*, Rastogi Publications.
10. Cherian M.C. & Ramachandran, (1952), *Bee keeping in South India* – Govt.Press,Chennai.
11. Johnson and Jeyachandra, (2000), *Apiculture* –, Marthandam, TamilNadu.
12. Kesary, M and M.Johnson, (1998), *Sericulture*, Department of Zoology, N.M.. Christian College, Marthandam.
13. Ganga. G, (2019), *Introduction to Sericulture*, Oxford and IBH Publishing
14. Jhingaran, V.G., (1997), *Fish and Fisheries of India*, Hindustan Publishing Corporation (India).
15. *Poultry farm manual: A reference guide for Central and State Poultry Farms*, (2014),- www.dadf.gov.in and www.dadh.nic.inDelhi.
16. Gnanamani M.R, (2010), Modern aspects of commercial poultry keeping, Deepam Publications, Madurai.
17. Santhanakumar, G &A.M. Selvaraj. (1993), *Concepts of Aquaculture*. Meenam Publications. Nagercoil Lekshmi Papers, Thirumal Complex, Opp. Chakkaravarthi theatre. Chettikulam Jn., Nagercoil – 629 002.
18. Sundararaj, V. &B. Srikrishnadhas, *Cultivable Aquatic Organisms*, Narendra Publishing House,1417, Kishan Dutt street, Maliwara, Delhi – 110 006
19. Singh, Herbans and Earl Moore, (1968), *Livestock and Poultry Production*, Prentice Hallin India.
20. Seethaleksmy, M and Dr.Samthi, R, (2012),.*Vermitechnology*, Saras Publications , Nagercoil.

Web references:

1. http//lib.mylibrary.com/ Open.aspx?id=463009
2. http://globalacademicgroup.com...pdf
3. http://tbmicollege.ac.in>gallery
4. http://www.researchgate.net>3473
5. http://www.periyaruniversity.ac.in

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	1	1	1	1	1
CO 2	3	3	2	2	1	1	1
CO 3	2	2	3	2	1	1	1
CO 4	2	3	2	3	2	2	2
CO 5	2	2	3	2	3	3	3
Total Score	12	12	11	10	8	8	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	1	1	1	1	1
CO 2	3	3	2	2	1	1	1
CO 3	2	2	3	2	1	1	1
CO 4	2	3	2	3	2	2	2
CO 5	2	2	3	2	3	3	3
Total Score	12	12	11	10	8	8	8

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

B.Sc Zoology

First Year Semester – II

Part	List of Courses	Credit	No. of Hours per week
Part-1	**Language** – Tamil / Other Languages	3	6
Part-2	**English**	3	4
Part-3	Core Course 2: **Chordata** Core Lab Course II: **Lab on Chordata** Allied -II (Generic /Discipline Specific): **Allied Botany II /** **Industrial Fish and Fisheries-II Biology of fish** Allied Lab Course: Elective-II- **Lab on Allied Botany II /** **Lab on Industrial Fish Fisheries-II Biology of Fish**	5 3 3 2	5 3 4 2
Part-4	Skill Enhancement Course – SEC-2: **Bio Composting for Entrepreneurship**	1	2
	Skill Enhancement Course – SEC-3: **Animal Behaviour**	1	2
	Naan Mudhalvan Course-1: Language Proficiency for Employability- Overview of English Communication*- Cambridge (Handled by English)	2	2
	Total	**23**	**30**

SEMESTER – II

CORE COURSE – CO3: CHORDATA

Course Code **CC3**	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	CHORDATA	Core	Y	-	-	-	5	5	25	75	100

Course Outcomes	
CO1	Understand the structures and distinctive features of Phylum Chordata.
CO2	Distinguish and explain the characteristic features of each subphylum and class of chordates.
CO3	Explain the economic importance of vertebrates in human welfare and ecosystem services.
CO4	Describe and interpret the adaptive features of vertebrates to different habitats and modes of life.
CO5	Understand and evaluate the evolutionary position and affinities of different vertebrate groups.

UNIT	**Details**	**No of hours**
I	**General Characters and Classification of Phylum Chordata**: Origin of Chordata, General characters of chordates and prochordates, Affinities and Systematic position of Hemichordata (*Balanoglossus*), Urochordata (*Ascidia*), Cephalochordata (*Amphioxus*). **Characteristics of subphylum Vertebrata**, Classification of Vertebrata upto Class level, Agnatha - *Petromyzon* - Ammocoetus larva.	12
II	Pisces - Type study : *Scoliodon sorrakowah* (External features, Digestive system, Respiratory system, Brain, Sense organs). General characters and classification of Pisces, Affinities of Dipnoi - Types of scales and fins - Accessory respiratory organs - Parental care - Migration - Economic importance.	12
III	**Amphibia:** General characters and classification - Origin of Amphibia - Type study : *Rana hexadactyla* (External features, Digestive system, respiratory system, Arterial system,Brain). - Adaptive features of Anura, Urodela and Apoda - Neoteny in Urodela - Parental care in Amphibia.	12
IV	**Reptilia:** General characters and classification - Type study: *Calotes versicolor* (External features, Digestive system, respiratory system, Arterial system, Brain). - Origin of reptiles, Extinct reptiles. Snakes of India – Identification of Poisonous and non-poisonous snakes - Poison apparatus and biting mechanism of poisonous snakes and first aid. Skull in reptiles as basis of classification	12
V	**Aves and Mammalia:** Aves: General characters and classification – Type study: *Columba livia* (External features, Endoskeleton, Urinogential system, Sense organs). - Flight adaptations, Migration. Mammalia: General characters and classification - Type study: *Rabbit* (External features, Endoskeleton, Excretory system, Brain, Sense organs).	12

	- Egg laying mammals, Marsupials, Flying mammals, Aquatic mammals, Dentition in mammals.		
	Total	**60**	
Text Books (Latest Editions)			
1	Ayyar, E.K. and T.N. Ananthakrishnan, (1992), *Manual of Zoology Vol. II* (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras.		
2	Jordan, E.K. and P.S. Verma, (1995), *Chordate Zoology and Elements of Animal Physiology*, 10th edition, S. Chand & Co Ltd., Ram Nagar, New Delhi,		
3	Nigam, H.C., (1983), *Zoology of Chordates,* Vishal Publications, Jalandhar - 144008,		
4	Ganguly, Sinha,. Bharati Goswami and Adhikari, (2004), *Biology of animals Vol.II* - New central book Agency (p) Ltd.		
5	Kotpal. R.L. A, (2009), *Modern text book of Zoology Vertebrates*- Rastogi publications.		
Reference Books (Latest editions, and the style as given below must be strictly adhered to)			
1	Darlington P.J. (2017), *Zoogeography:The Geographical Distribution of Animals*, R.E. Krieger Pub. Co.		
2	Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution. IV* Edition. Jones and Bartlett Publishers Inc.		
3	Hickman, C.P. Jr., F.M.Hickman and L.S. Roberts, (1984), *Integrated Principles of Zoology,* 7th Edition, Times Merror/Mosby College Publication. St. Louis.		
4	Newman, H.H., (1981), *The Phylum Chordata*, Satish Book Enterprise, Agra – 282 003		
5	Parker and Haswell, (1964), *Text Book of Zoology, Vol II (Chordata)*, A.Z.T,B.S. Publishers and Distributors, New Delhi - 110 051		
6	Pough H. (2009) *Vertebrate life*, VIII Edition, Pearson International.		
7	Waterman, Allyn J. et al., (1971), *Chordate Structure and Function*, Mac Millan &Co., New York		
8	Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.		
Web Resources			
1	http://tolweb.org/Chordata/2499		
2	https://www.nhm.ac.uk/		
3	https://bit.ly/3Av1Ejg		
4	https://bit.ly/3kqTfYz		
5	https://biologyeducare.com/aves/		
6	https://www.vedantu.com/biology/mammalia		

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	1	1	1	1	1
CO 2	3	3	2	2	1	1	2
CO 3	2	2	3	2	3	2	3
CO 4	2	3	2	3	2	2	2
CO 5	3	3	2	3	2	1	2
Total Score	13	13	10	11	9	7	10

0 – No Correlation 1 – Low 2 - Medium 3 – High

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	1	1	1	2	1
CO 2	3	3	2	2	2	1	1
CO 3	2	3	3	2	3	3	3
CO 4	3	2	2	3	2	2	2
CO 5	2	3	3	3	1	2	3
Total Score	13	13	11	11	9	10	10

0 – No Correlation 1 – Low 2 - Medium 3 – High

SEMESTER – II
CORE COURSE – CO4: LAB ON CHORDATA

Course Code **CC4**	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	LAB ON CHORDATA	Core	-	-	Y	-	3	3	50	50	100
Course Outcomes											
CO1	Understand the structures and distinctive features of Phylum Chordata through practical observation and dissection.										
CO2	Distinguish the characteristic features of different subphyla and classes of chordates using specimens and slides.										
CO3	Compare the structure of various internal organs in different classes of vertebrates through dissections and osteology.										
CO4	Classify chordate animals and interpret their adaptations and affinities using practical specimens.										
CO5	Develop practical skills in observation, specimen identification, mounting, recording,										

	and maintenance of laboratory records.		
UNIT	**Details**		**Course Objectives**
I	**Dissections:** Fish: External features, Digestive system (Sardine or any other fish) Frog: External features, Digestive system (Demo), Arterial System (Demo/Virtual)		CO1
II	**Mounting:** Fish: Placoid and Ctenoid scales, Frog: Hyoid apparatus and Brain (Demonstration).		CO2
III	**Osteology:** Frog/ mammal: Skull , Vertebral column, Pectoral girdle, Pelvic girdle, Fore limb, Hind limb, Chelonia: Anapsid skull. Pigeon: skull, and synsacrum.		CO3
IV	**Specimen and Slides:** 1. **Hemichordata:** Balanoglossus 2. **Urochordata:** Herdmania 3. **Cephalochordata:** Amphioxus, 4. **Cyclostomata:** Petromyzon, Ammocoetus larva 5. **Pisces:** Shark, Torpedo, Cybium, Hippocampus, Exocoetus, Echieneis, Labeo, Catla, Clarius, Anguilla, 6. **Amphibia:** Ichthyophis, Amblystoma, Rachophous, Bufo, Rana, Axolotal larva 7. **Reptilia:** Draco, Chemaeleon, Vipera russelli, Naja, Bungarus, Enhydrina, Chelon. 8. **Aves:** Passer, Bubo, Alcedo, Columba, Corvus, Pavo, **Collection and study of different types of feathers:** Quill, Contour, Filoplume, Down 9. **Mammalia:** Ornithorhynchus, Manis, Loris, Hedgehog		CO4
V	Record / Observation Note (SUBMISSION IS MANDATORY)		CO5
Text Books (Latest Editions)			
1	Lal S S, (2009), *Practical Zoology Vertebrate*, Rajpal and Sons Publishing,		
2	Verma P.S,(2000). *A Manual of Practical Zoology: Chordates,* S.Chand Limited, 627pp.		
Reference Books (Latest editions, and the style as given below must be strictly adhered to)			
1	Robert William Hegner, (2015). Practical Zoology, Biblio Life,		
2	Young, J,Z., 1972. The life of vertebrates. OxfordUni. London.		
Web Resources			
1	https://www.youtube.com/watch?v=b04hc_kOY10		
2	https://bit.ly/3CzTEy8		

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3	http://tolweb.org/Chordata/2499

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	2	2	3	1	1
CO 2	3	3	2	2	2	2	1
CO 3	2	3	3	3	2	1	2
CO 4	2	3	2	3	2	2	3
CO 5	2	2	3	2	3	2	3
Total Score	12	13	12	12	12	8	10

0 – No Correlation 1 – Low 2 - Medium 3 – High

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	2	2	3	1	2
CO 2	3	3	2	2	2	1	1
CO 3	2	3	3	3	2	1	1
CO 4	2	3	2	3	2	2	2
CO 5	2	3	2	2	3	2	3
Total Score	12	13	12	12	12	7	9

0 – No Correlation 1 – Low 2 - Medium 3 – High

SEMESTER – II

PART – IV

Skill Enhancement Course – SEC-2

BIOCOMPOSTING FOR ENTREPRENEURSHIP

Hours: 2 Credit- 1

COURSE OUTCOMES:

CO1:Understand the concept, types, and ecological importance of biocomposting.

CO2:Demonstrate different biocomposting technologies and methods used in waste management and recycling.

CO3:Prepare biocompost pits and beds using suitable amendments for compost production.

CO4:Analyze the applications of biocompost in soil fertility, plant growth promotion, and waste reduction.

CO5:Evaluate the economics and entrepreneurial opportunities involved in establishing small-scale biocompost units and prepare project proposals.

Unit – I :

Biocomposting – Definition, types and ecological importance.

Unit – II:

Types of Biocomposting technology – Field pits/ground heaps/ tank/large-scale/batch and continuous methods.

Unit – III

Preparation of Biocompost pit and bed using different amendments.

Unit – IV

Applications of Biocompost in soil fertility maintenance, promotion of plant growth, value added products, waste reduction, etc.

Unit – V

Economics of establishment of a small biocompost unit – project report proposal for Self Help Group (Income and employment generation).

Practical

- Preparation procedures for Biocompost pit.
- Selection of Biocompost material, separation of Compostable and Non-compostable materials.
- Packing and marketing of Biocompost.
- Field visit to Biocomposting unit.

References

1. Bikas R. Pati& Santi M. Mandal (2016). Recent trends in composting technology.
2. Van der Wurff, A.W.G., Fuchs, J.G., Raviv, M., Termorshuizen, A.J. (Editors) 2016. Handbook for Composting and Compost Use in Organic Horticulture. BioGreenhouse COST Action FA 1105, www.biogreenhouse.org.

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	1	2	2	2	2
CO 2	2	3	3	2	3	2	2
CO 3	2	2	3	2	3	2	2
CO 4	2	3	2	3	3	3	2
CO 5	2	3	3	3	3	2	3
Total Score	11	13	12	12	14	12	11

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	1	2	2	2	2
CO 2	2	3	3	2	3	2	2
CO 3	2	2	3	2	3	2	2
CO 4	2	3	2	3	3	3	2
CO 5	2	3	3	3	3	3	3
Total Score	11	13	12	12	14	12	11

0 – No Correlation **1 – Low** **2 - Medium** **3 – High**

SEMESTER - II

PART – IV

Skill Enhancement Course – SEC-3

ANIMAL BEHAVIOUR

Hours: 2 Credit- 1

COURSE OUTCOMES

CO1: Explain the origin and development of animal behaviour and the influence of genetics and environment on behaviour.

CO2: Understand the biological, ecological, and evolutionary basis of animal behaviour.

CO3: Compare innate and learned behaviours and differentiate various mating systems in animals.

CO4: Interpret communication systems, courtship, social behaviour, and animal personality in relation to survival and adaptation.

CO5: Evaluate movement, migration, and chronobiological behaviours as adaptive responses shaped by natural selection.

Unit I:

Genetics and Behaviour: Genetic material, Genes and chromosomes, Genetic variation, Single and Polygenic inheritance of behaviour, Heritability of behaviour, Natural selection and behaviour, Frequency distribution of phenotypes, Darwinian fitness, Evolution of adaptive strategies.

Unit II:

Evolution and Social Behaviour: Sexual selection, Altruism, and social organisation, Animal perception, Neural control of behaviour, Visual adaptations to unfavourable environments.

Unit III:

Animal and the Environment: Coordination and Orientation, Homeostasis and Behaviour, Physiology and Behaviour in changing environments, Animal Learning, Conditioning and Learning, Cognitive aspects of learning.

Unit IV:

Understanding Complex Behaviour: Instinct and learning, Displacement activities, Decision making behaviour in Animals, Complex behaviour of hobby bees, Mechanism of Decision making. The mentality of Animals: Languages and mental representation, non-verbal communication in humans, mental images, Intelligence, tool use and culture.

Unit V:

Chronobiology : Organization of circadian system in multicellular animals; Concept of central and peripheral clock system; Photoreception and photo- transduction; The physiological clock and measurement of day length; The relevance of biological clocks for human welfare - Clock function (dysfunction).

Text Books

1. David McFarland, (1985), *Animal Behaviour*, Longman Scientific & Technical, UK.
2. Harjindra Singh,(1990), *A Text Book of Animal Behaviour,* Anomol Publication.

3. Hoshang S.Gundevia and Hare Goving Singh, (1996), *Animal Behaviour,* S.Chand & Co.
4. Shukla, J. P (2010), *Fundamentals of Animal Behaviour*, Atlantic.
5. Vinod Kumar, (2002), *Biological Rhythms.* Narosa Publishing House, Delhi.

Suggested Readings

1. Michael D. Breed and Janice Moore, (2012), *Animal Behaviour*, Academic Press, USA.
2. Aubrey Manning and Martin Stamp Dawkins, (2012), *An Introduction to Animal Behaviour*, 6th Edition, Cambridge University Press, UK.
3. Davis E.Davis, (1970), *Integral Animal Behaviour,* Mac Millan Company, London,
4. Jay, C. Dunlap, Jennifer, J. Loros, Patricia J. De Coursey (ed). (2004), *Chronobiology Biological time Keeping,* Sinauer Associates Inc, Publishers, Sunderland, MA.

Web Resources

1. https://www.ncbs.res.in/content/animal-behaviour
2. https://bit.ly/3i6wUxR
3. https://www.behaviour.univie.ac.at/
4. https://www.ru.nl/bsi/

CO – PO Mapping (Course Articulation Matrix):

CO / PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	3	2	2	2	1	1	2
CO 2	3	3	2	3	1	2	2
CO 3	2	3	2	2	3	2	2
CO 4	2	3	2	3	2	2	3
CO 5	2	3	3	3	2	3	3
Total Score	12	14	11	13	9	10	12

0 – No Correlation 1 – Low 2 - Medium 3 – High

CO – PSO Mapping (Course Articulation Matrix):

CO / PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2	2	2	1	1	2
CO 2	3	3	2	3	2	2	2
CO 3	2	3	2	2	3	2	2
CO 4	2	3	2	3	2	2	3
CO 5	2	3	3	3	2	3	3
Total Score	12	14	11	13	10	10	12

0 – No Correlation 1 – Low 2 - Medium 3 – High

10. MODEL QUESTION PAPER

Manonmaniam Sundaranar University, Tirunelveli – 2

B.Sc Zoology Programme

(For those who joined from 2026-2027 onwards)

Semester – I

Core Course 1: Invertebrata

Time: 3 hrs Maximum: 75 Marks

Part A ((10 × 1 = 10 Marks)

Answer All Questions

1. The locomotory organelles in Paramecium are
   a) Pseudopodia b) Flagella
   c) Cilia d) Tentacles
2. The causative organism of Kala-azar is
   a) Entamoeba histolytica b) Trypanosoma gambiense
   c) **Leishmania donovani** d) Plasmodium vivax
3. The canal system found in Sycon is
   a) Ascon type b) **Sycon type**
   c) Leucon type d) Rhagon type
4. Polymorphism is commonly seen in
   a) **Hydrozoa** b) Trematoda
   c) Polychaeta d) Cephalopoda
5. Fasciola hepatica belongs to the class
   a) Turbellaria b) **Trematoda**
   c) Cestoda d) Nematoda
6. The causative organism of filariasis is
   a) Ancylostoma duodenale b) Enterobius vermicularis
   c) **Wuchereria bancrofti** d) Ascaris lumbricoides
7. Metamerism is well developed in
   a) Mollusca b) **Annelida**
   c) Porifera d) Protozoa
8. Peripatus is considered as a connecting link between
   a) Mollusca and Echinodermata b) **Annelida and Arthropoda**
   c) Coelenterata and Annelida d) Protozoa and Porifera
9. Torsion is characteristic of
   a) Cephalopoda b) **Gastropoda**
   c) Bivalvia d) Scaphopoda
10. The water vascular system is characteristic of

a) Arthropoda b) Mollusca
c) **Echinodermata** d) Annelida

Part B ((5 × 5 = 25 Marks)
Answer all questions, choosing (a) or (b) about 250 words

11. a) Explain the nutrition in Protozoa with suitable examples.
or
b) Describe the host–parasite interaction in Entamoeba and Plasmodium.
12. a) Explain the canal system in sponges.
or
b) Write an account on corals and coral reefs and their economic importance.
13. a) Describe the parasitic adaptations in Fasciola hepatica.
or
b) Explain the life cycle and pathogenicity of Wuchereria bancrofti.
14. a) Explain metamerism and its significance in Annelida.
or
b) Discuss the affinities of Peripatus.
15. a) Describe torsion in Mollusca.
or
b) Explain the water vascular system in Echinodermata.

Part B ((5 × 8 = 40 Marks)
Answer all questions, choosing (a) or (b) about 600 words

16. a) Give a detailed account of Paramecium with neat labelled diagrams.
or
b) Discuss the general characters and classification of Protozoa up to classes.

17. a) Evaluate the essence of alternate of generation in Obelia.
or
b) Explain the general characters, classification and polymorphism in Hydrozoa.

18. a) Describe the morphology and life cycle of Fasciola hepatica.
or
b) Explain the general characters and classification of Aschelminthes up to classes with parasitic adaptations.

19. a) Discuss the general characters and classification of Arthropoda up to classes.
or
b) Describe Penaeus indicus and explain the larval forms in Crustacea.

20. a) Explain the general characters and classification of Mollusca up to classes with notes on foot.
or

b) Describe Asterias and explain the larval forms of Echinoderms.

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