

Bachelor of Science



Zoology

**SRI VIDYA MANDIR ARTS  
SCIENCE COLLEGE**

**(Autonomous)**

[An Autonomous College Affiliated to Periyar University, Salem, Tamil Nadu]

[Accredited by NAAC with 'A' Grade with CGPA of 3.27]

[Recognized 2(f)& 12(B) Statuvs under UGC Act. 1956]

**Katteri – 636 902, Uthangarai (Tk), Krishnagiri (Dt)**

**Tamil Nadu, India**

**Website:www.svmcugi.comE-mail:svmzoologyug@gmail.com**



**BACHELOR OF SCIENCE IN ZOOLOGY**

**CHOICE BASED CREDIT SYSTEM (CBCS&OBES)**

**REGULATIONS AND SYLLABUS FOR**

**B.Sc. ZOOLOGY PROGRAMME**

**(SEMESTER PATTERN)**

**(For Students Admitted in the College from  
the Academic Year 2020-2021 Onwards)**



## REGULATIONS AND SYLLABUS FOR B.Sc. ZOOLOGY PROGRAMME

(For Students Admitted in the College from the Academic Year 2020-2021 Onwards)

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### 1. Vision of the Department

To create the students comprehends the diversity, Habitat and performance carrying out of animals in order to protect the environment and promoting the new biology and it's Technology.

To achieve academic excellence.

### 2. Mission of the Department

Broadcasting knowledge in Animal Sciences through innovative teaching and learning and also to make awareness about problems affecting Animal and Human health and world challenging environmental issues.

To create receptive mindset among the students of the department through field study project work and study tour etc.

### 3. Definitions:

- (i) **Programme:** Programme means a course of study leading to the award of the degree in a discipline.
- (ii) **Course:** Course refers to the subject offered under the Degree Programme.

### 4. Aims of the Programme

1. Impart critical thinking skills and evaluation of information among students in Zoology.
2. Provide a conducive environment that ensures cognitive development of students in a holistic manner.
3. Gain knowledge by students across wide areas of animal science and evolution of land animal.
4. Facilitate an opportunity among students to familiarize with life cycles and mode of reproduction in different animal groups.
5. Create an opportunity among students to understand relationship between zoology and its relevant disciplines, such as Biotechnology, Microbiology, Biochemistry, Biophysics, Bioinformatics, and Nano-biotechnology.
6. Understand importance of population and community ecology, ecosystem dynamics, biosphere and its future by students.



7. Gain in depth knowledge by students in taxonomy.
8. Mould students as accountable citizens having awareness of most basic domain- independent knowledge, including critical thinking and communication.
9. Enable students to prepare for different research/teaching qualification and competitive examinations.

#### 5. Programme Outcomes (PO)

|            |   |
|------------|---|
| <b>PO1</b> | Apply the knowledge of various branches of Zoology and General biology meant both for a graduate terminal course and for higher studies.  |
| <b>PO2</b> | Acquire basic skills in the observation and study of nature, biological techniques, experimental skills and scientific investigation.   |
| <b>PO3</b> | Learning handling DNA sequence data and its analysis which equip students to get employed in R&D in the industry involved in DNA sequencing services, diagnostics, and microbiome analysis. |
| <b>PO4</b> | Development of theoretical and practical knowledge in handling the animals and using them as model organism   |
| <b>PO5</b> | Development of an understanding of zoological science for its application in medical entomology, Apiculture, Aquaculture, Agriculture and Modern medicine.                                  |

#### 6. Programme Specific Outcomes(PSO)

|             |  |
|-------------|--|
| <b>PSO1</b> | Identify and list out common animals in vertebrate and non-vertebrate<br>Explain various physiological and biochemical changes in human  |
| <b>PSO2</b> | Students can apply the knowledge and relate the information gained from the allied subjects viz; Botany and Chemistry, to explain and conclude through the Interdisciplinary approaches. |
| <b>PSO3</b> | The students enhance knowledge on the pathways of metabolisms and Explain the role and impact of different environmental conservation programmes   |
| <b>PSO4</b> | Understanding the importance of genetic engineering new tools  |



|             |   |
|-------------|---|
| <b>PSO5</b> | Identify animals beneficial to humans and Use tools of information technology for all activities related to zoology |
|-------------|---|

### 7. Eligibility for Admission

A candidate who has passed Higher Secondary Examination in Academic or vocational stream with Zoology/Biology under higher secondary board of examination, Tamil Nadu or an examination accepted as Equivalent there to by the syndicate subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the B.Sc Degree examination of this Autonomous College affiliated to Periyar University.

### 8. Duration of the Programme

The Programme for the Degree of Bachelor of Science (B.Sc.) in Zoology shall consist of three academic years divided into six semesters. Each Semester consists of 90 working days(450 hours).

### 9. Features of Choice Based Credit System

Under Choice Based Credit System (CBCS), a set of Courses consisting of Core Courses, Elective Courses, Skill Based Elective Courses and Non-Major Elective Courses are offered. Beside the Core Courses, which are totally related to the major subject, the students have the advantage of studying supportive papers and Non-Major Courses. This provides enough opportunity to the students to learn not only the major courses but also inter-disciplinary and application oriented courses.

### 10. Syllabus

The syllabus of the B.Sc. Zoology Degree Programme is divided into the following Courses:

1. Language Course
2. Core Courses
3. Elective Courses
4. Skill Based Elective Courses (SBEC)
5. Non-Major Elective Courses
6. Extension Activity
7. Extra Credit Courses

#### (i) Language Courses:

(ii) **Core Courses:** The Core Courses are related to the Programme concerned including practicals offered under the Programme.



(iii) **Elective Courses:** There are TWO Elective Courses offered under the Programme related to the major or non-major but are to be selected by the students.

(iv) **Skill Based Elective Courses (SBEC):** This course aims to impart advanced and recent developments in the concerned discipline.

(v) **Non-Major Elective Courses (NMEC):** Irrespective of the discipline, the student can select papers that are offered by other disciplines as non-major elective course.

(vi) **Extension Activity:** Participation in NSS/NCC/YRC/RRC/Sports or other co-circular activities are considered as Extension Activity.

(vii) **Extra Credit Courses:** In order to facilitate the students gaining extra credits, the Extra Credit Courses are offered. According to the guidelines of the UGC, the students are encouraged to avail this option of enriching the knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals, such as SWAYAM, NPTEL, etc.

### 11. Programme of Study

The Programme of study for the Degree shall be in the Branch – Zoology (Choice Based Credit System) with internal assessment comprised of instructions in the following subjects according to the syllabi and books prescribed from time to time.

### 12. Credit

Weightage given to each course of study is termed as Credit.

### 13. Credit System

The weightage of credits are spread over to four different semesters during the period of study and the cumulative credit point average shall be awarded based on the credits earned by the student. A total of **140** Credits are prescribed for the B.Sc. Zoology Degree Programme which is the minimum Credit requirement for the three years B.Sc. Zoology Degree Programme.



## SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE (Autonomous)

### Bachelor of Science (B.Sc.) in Zoology Course Pattern and Syllabus – CBCS

(For Students Admitted in the B.Sc. in Zoology the Academic Year 2020-2021 Onwards)

| Sl. No.            | Part       | Nature of the Course | Subject Code               | Title of the Paper                | Hours / Week | Credits   | Marks      |            |            |
|--------------------|------------|----------------------|----------------------------|-----------------------------------|--------------|-----------|------------|------------|------------|
|                    |            |                      |                            |                                   |              |           | CIA        | ESE        | Total      |
| <b>SEMESTER-I</b>  |            |                      |                            |                                   |              |           |            |            |            |
| 1                  | I          | Language             | 21UFTA101                  | Tamil - I                         | 6            | 3         | 25         | 75         | 100        |
| 2                  | II         | Language             | 21UFEN101                  | English-I                         | 6            | 3         | 25         | 75         | 100        |
| 3                  | III        | Core-I               | 21UZO1C01                  | Invertebrate I                    | 5            | 5         | 25         | 75         | 100        |
| 4                  |            | Allied-I             | 21UCH1A01                  | Allied Chemistry - I              | 5            | 4         | 25         | 75         | 100        |
|                    |            |                      | 21UBO1A01                  | Allied Botany - I                 |              |           |            |            |            |
| 5                  |            | Core Practical-I     | 21UZO2P01                  | Lab Course-I (Covering core I-II) | 3            | -         | -          | -          | -          |
| 6                  |            | Allied Practical-I   | 21UCH2AP01                 | Allied Chemistry Lab Course-I     | 3            | -         | -          | -          | -          |
|                    | 21UBO2AP01 |                      | Allied Botany Lab Course-I |                                   |              |           |            |            |            |
| 7                  | IV         | Value Education      | 21UVE101                   | Yoga                              | 2            | 2         | 25         | 75         | 100        |
| <b>Total</b>       |            |                      |                            |                                   | <b>30</b>    | <b>17</b> | <b>125</b> | <b>375</b> | <b>500</b> |
| <b>SEMESTER-II</b> |            |                      |                            |                                   |              |           |            |            |            |
| 8                  | I          | Language             | 21UFTA202                  | Tami l- II                        | 6            | 3         | 25         | 75         | 100        |
| 9                  | II         | Language             | 21UFEN202                  | English -II                       | 6            | 3         | 25         | 75         | 100        |
| 10                 |            | Core-II              | 21UZO2C02                  | InvertebrateII                    | 5            | 5         | 25         | 75         | 100        |
| 11                 |            | Allied-II            | 21UCH2A02                  | Allied Chemistry - II             | 5            | 4         | 25         | 75         | 100        |
|                    |            |                      | 21UBO2A02                  | Allied Botany - II                |              |           |            |            |            |



|    |     |                    |            |                                   |   |   |    |    |     |
|----|-----|--------------------|------------|-----------------------------------|---|---|----|----|-----|
| 12 | III | Core Practical-I   | 21UZO2P01  | Lab Course-I (Covering core I-II) | 3 | 4 | 40 | 60 | 100 |
| 13 |     | Allied Practical-I | 21UCH2AP01 | Allied Chemistry Lab Course-II    | 3 | 3 | 40 | 60 | 100 |

|              |    |              |            |                             |           |           |            |            |            |
|--------------|----|--------------|------------|-----------------------------|-----------|-----------|------------|------------|------------|
|              |    |              | 21UBO2AP01 | Allied Botany Lab Course-II |           |           |            |            |            |
| 14           | IV | Common Paper | 21UES201   | Environmental Studies       | 2         | 2         | 25         | 75         | 100        |
| <b>Total</b> |    |              |            |                             | <b>30</b> | <b>24</b> | <b>205</b> | <b>495</b> | <b>700</b> |

**SEMESTER-III**

|              |     |                      |            |                                      |           |           |            |            |            |
|--------------|-----|----------------------|------------|--------------------------------------|-----------|-----------|------------|------------|------------|
| 15           | I   | Language             | 21UFTA303  | Tami I- III                          | 5         | 3         | 25         | 75         | 100        |
| 16           | II  | Language             | 21UFEN303  | English -III                         | 5         | 3         | 25         | 75         | 100        |
| 17           | III | Core-III             | 21UZO3C03  | Chordata                             | 5         | 5         | 25         | 75         | 100        |
| 18           |     | Allied -III          | 21UCH3A03  | Allied Chemistry - III               | 5         | 4         | 25         | 75         | 100        |
|              |     |                      | 20UBO3A03  | Allied Botany - III                  |           |           |            |            |            |
| 19           | III | Core Practical-II    | 21UZO2P02  | Lab Course-II (Covering core II-III) | 3         | -         | -          | -          | -          |
| 20           |     | Allied Practical-III | 21UCH4AP02 | Allied Lab Course-III Chemistry      | 3         | -         | -          | -          | -          |
| 21           |     |                      | 21UBO4AP02 | Allied Lab Course-III Botany         |           |           |            |            |            |
| 22           | IV  | SBEC-I               | 21UZO3S01  | Aquaculture                          | 2         | 2         | 25         | 75         | 100        |
| 23           |     | NMEC-I               |            | Non Major Elective Course - I        | 2         | 2         | 25         | 75         | 100        |
| <b>Total</b> |     |                      |            |                                      | <b>30</b> | <b>19</b> | <b>150</b> | <b>450</b> | <b>600</b> |

**SEMESTER-IV**

|    |     |            |           |                            |   |   |    |    |     |
|----|-----|------------|-----------|----------------------------|---|---|----|----|-----|
| 24 | I   | Language   | 21UFTA404 | Tami I- IV                 | 5 | 3 | 25 | 75 | 100 |
| 25 | II  | Language   | 21UFEN404 | English -IV                | 5 | 3 | 25 | 75 | 100 |
| 26 | III | Core-IV    | 21UZO4C04 | Cell Biology               | 5 | 5 | 25 | 75 | 100 |
| 27 |     | Allied -IV | 21UCH4A04 | Allied Chemistry - IV      | 5 | 4 | 25 | 75 | 100 |
| 28 |     |            | 21UBO4A04 | Allied Botany - IV         |   |   |    |    |     |
| 29 |     | SBEC-II    | 21UZO4S02 | Sericulture and Apiculture | 2 | 2 | 25 | 75 | 100 |



|                         |     |                     |            |                                      |            |            |             |             |             |
|-------------------------|-----|---------------------|------------|--------------------------------------|------------|------------|-------------|-------------|-------------|
| 30                      | IV  | NMEC-II             |            | Non Major Elective Course – II       | 2          | 2          | 25          | 75          | 100         |
| 31                      | III | Core Practical-II   | 21UZO4P02  | Lab Course-II (Covering core II-III) | 3          | 4          | 40          | 60          | 100         |
| 32                      |     | Allied              | 21UCH4AP02 | Allied Lab Course - IV Chemistry     | 3          | 3          | 40          | 60          | 100         |
| <b>Total</b>            |     |                     |            |                                      | <b>30</b>  | <b>26</b>  | <b>230</b>  | <b>570</b>  | <b>800</b>  |
| <b>SEMESTER-V</b>       |     |                     |            |                                      |            |            |             |             |             |
| 34                      | III | Core- V             | 21UZO5C05  | Animal Physiology                    | 5          | 5          | 25          | 75          | 100         |
| 35                      |     | Core- VI            | 21UZO5C06  | Principles of Genetics               | 5          | 5          | 25          | 75          | 100         |
| 36                      |     | Core- VII           | 21UZO5C07  | Biochemistry                         | 5          | 4          | 25          | 75          | 100         |
| 37                      |     | Elective –I         |            | Group-A                              | 5          | 3          | 25          | 75          | 100         |
| 38                      | IV  | SBEC-III            | 21UZO5S03  | Biotechnology                        | 2          | 2          | 25          | 75          | 100         |
| 39                      |     | SBEC-IV             | 21UZO5S04  | Vermitechnology                      | 2          | 2          | 25          | 75          | 100         |
| 40                      | III | Core Practical-III  | 21UZO6P03  | Lab Course-III (Covering Core V-VII) | 3          | -          | -           | -           | -           |
| 41                      |     | Core Practical-IV   | 21UZO6P04  | Lab Course-IV (Covering Core VIII-X) | 3          | -          | -           | -           | -           |
| <b>Total</b>            |     |                     |            |                                      | <b>30</b>  | <b>21</b>  | <b>150</b>  | <b>450</b>  | <b>600</b>  |
| <b>SEMESTER-VI</b>      |     |                     |            |                                      |            |            |             |             |             |
| 42                      | III | Core-VIII           | 21UZO6C08  | Ecology and Ethology                 | 5          | 5          | 25          | 75          | 100         |
| 43                      |     | Core-IX             | 21UZO6C09  | Evolution                            | 5          | 5          | 25          | 75          | 100         |
| 44                      |     | Core-X              | 21UZO6C10  | Developmental Biology                | 5          | 5          | 25          | 75          | 100         |
| 45                      |     | Elective-II         | 21UZO6E03  | Group-B                              | 5          | 3          | 25          | 75          | 100         |
| 46                      | IV  | SBEC-V              | 21UZO6S05  | Public Health and Hygiene            | 2          | 2          | 25          | 75          | 100         |
| 47                      |     | SBEC-VI             | 21UZO6S06  | Poultry Science                      | 2          | 2          | 25          | 75          | 100         |
| 48                      | III | Core- Practical-III | 21UZO6P03  | Lab Course-III (Covering Core V-VII) | 3          | 4          | 40          | 60          | 100         |
| 49                      |     | Core- Practical-IV  | 21UZO6P04  | Lab Course-IV (Covering Core VIII-X) | 3          | 4          | 40          | 60          | 100         |
|                         |     |                     |            | Extension activities                 | -          | 1          | -           | -           | 100         |
| <b>Total</b>            |     |                     |            |                                      | <b>30</b>  | <b>31</b>  | <b>230</b>  | <b>570</b>  | <b>900</b>  |
| <b>CUMULATIVE TOTAL</b> |     |                     |            |                                      | <b>180</b> | <b>140</b> | <b>1090</b> | <b>2910</b> | <b>4100</b> |
| 33                      |     |                     | 20UBO4AP02 | Allied Lab Course-IV Botany          |            |            |             |             |             |



**Note:**

- CBCS – Choice Based Credit system  
 CIA – Continuous Internal Assessment  
 ESE – End of Semester Examinations  
 SWAYAM – Study Webs of Active-Learning for Young Aspiring Minds  
 NPTEL – National Programme on Technology Enhanced

**Major Elective Courses**

| Semester            | Course Code | Paper Title                             | Credits |
|---------------------|-------------|---|---------|
| <b>Group – A</b>    |             |   |         |
| <b>Semester -V</b>  | 20UZO5E01   | Medical Laboratory Techniques           | 3       |
|                     | 20UZO5E02   | Biostatistics and computational Biology | 3       |
| <b>Group – B</b>    |             |   |         |
| <b>Semester –VI</b> | 20UZO6E03   | Immunology and Microbiology             | 3       |

**Non-Major Elective Courses:**

| Semester            | Course Code | Paper Title     | Credits |
|---------------------|-------------|-----------------|---------|
| <b>Semester III</b> | 20UZO3N01   | Poultry Science | 2       |
| <b>Semester IV</b>  | 20UZO4N02   | Sericulture     | 2       |

**14. Break-Up of Marks and Credits**

The break-up of marks and credits for the B.Sc. Zoology Degree Programme is as follows:

| Sl. No. | Part | Subject            | Marks | Credits |
|---------|------|--------------------|-------|---------|
| 1.      | I    | Language – Tamil   | 400   | 12      |
| 2.      | II   | Language – English | 400   | 12      |
| 3.      | III  | Core – Theory      | 1000  | 50      |
|         |      | Core –Practical    | 400   | 16      |
|         |      | Allied – Theory    | 400   | 16      |
|         |      | Allied – Practical | 200   | 06      |



|              |    |                              |             |            |
|--------------|----|------------------------------|-------------|------------|
|              |    | Major Elective Courses       | 200         | 06         |
| 4.           | IV | Skill Based Elective Courses | 600         | 12         |
|              |    | Non-Major Elective Courses   | 200         | 4          |
|              |    | Environmental Studies        | 100         | 2          |
|              |    | Value Education              | 100         | 2          |
| 5.           | V  | Extension Activities         | 100         | 2          |
| <b>Total</b> |    |                              | <b>4100</b> | <b>140</b> |

1. The students are advised to complete one **SWAYAM/MOOC** course per year and submit the course completion certificate to the HOD during the even semester of each year. Two credits will be given for each **SWAYAM/MOOC** course who have successfully completed.
2. The field trip preferably relevant to the course should be undertaken every year.

### 15. Examinations

The examinations consist of Continuous Internal Assessment (CIA) and end of semester examinations (ESE). The ESE shall be of Three Hours duration for each theory course at the end of every semester. The candidate failing in any course(s) will be permitted to appear for each failed course(s) in the subsequent examination. The end of semester practical examinations shall be of Three Hours for each practical course conducted at the end of every even semester.

To maintain uniformity, particularly for interdepartmental transfer of credits, there shall be a uniform pattern of examination to be adopted by all the teachers offering courses. There shall be two tests, seminar and assignment for CIA and ESE during each semester. The distribution of marks for CIA and ESE shall be 25 marks and 75 marks, respectively. Further, the distribution of CIA will be 15 marks for test, 5 marks for assignment and 5 marks for attendance. The average of the highest two test marks will be taken for CIA.

### 16. Components of Continuous Internal Assessment (CIA)

| Components    |    | Marks            | Total Marks |
|---------------|----|------------------|-------------|
| <b>Theory</b> |    |                  |             |
| CIA I         | 75 | (75+75 = 150/10) |             |



|                                |    |    |    |
|--------------------------------|----|----|----|
| CIA II                         | 75 | 15 | 25 |
| Assignment                     |    | 05 |    |
| Attendance                     |    | 05 |    |
| <b>Practical</b>               |    |    |    |
| CIA                            |    | 25 | 40 |
| Practical Observation Notebook |    | 10 |    |
| Attendance                     |    | 05 |    |

### 17. Question Paper Pattern

#### Bloom's Taxonomy Based Assessment Pattern

(K1–Remember; K2–Understand; K3–Apply; K4–Analyze; K5–Evaluate; K6–Create)

#### (i) Theory Examinations (CIA I & CIA II = 25 Marks and ESE = 75 Marks)

| Knowledge Level    | Section  | Marks              | Description  | Total Marks |
|--------------------|--|--------------------|--|-------------|
| K1                 | A<br>(Answer ALL)<br>Q1–Q15                          | $15 \times 1 = 15$ | Multiple Choice Questions<br>(MCQ)<br>(Three questions from each unit) | 15          |
| K2                 | B<br>(Answer any<br>THREE out of<br>FIVE)<br>Q16–Q20 | $3 \times 5 = 15$  | Short Answers<br>(One question from each unit)                         | 15          |
| K3 & K4            | C<br>(Either or<br>Pattern)<br>Q21–Q25               | $5 \times 9 = 45$  | Descriptive/Detailed Answers<br>(Two questions from each unit)         | 45          |
| <b>Total Marks</b> |  |                    |  | <b>75</b>   |

Passing Minimum (CIA) 40% = 10 Marks

Passing Minimum (ESE) 40% = 30 Marks

**40 Marks**

**(ii) Practical Examinations (CIA = 40 Marks and ESE = 60 Marks)**

| Knowledge Level | Components  | Marks | Total |
|-----------------|-------------|-------|-------|
| K3              | Experiments | 50    | 60    |
| K4              | Record Work | 10    |       |
| K5              |             |       |       |

Passing Minimum (CIA) 40% = 16 Marks

Passing Minimum (ESE) 40% = 24 Marks

**40 Marks**

The candidate shall be declared to have passed the theory examination if the candidates secure not less than 30 marks out of 75 marks in the semester examination in each theory course and 10 marks out of 25 marks in the CIA and in total not less than 40 marks. For the practical course, 24 marks out of 60 marks in the semester examination and the record notebook taken together and 16 marks out of 40 marks in the CIA and in total 40 marks. There is no passing minimum for the record notebook. However, submission of the record notebook is necessary.

Candidate who does not obtain the required minimum marks for a pass in a Course/Practical/Project shall be declared Re-Appear (RA) and the candidate has to appear and pass the same at a subsequent appearance.

**18. Maximum Duration for the Completion of the B.Sc. Zoology Programme**

The maximum duration for completion of the B.Sc. Zoology Programme shall not exceed twelve semesters.

**19. COMMENCEMENT OF THIS REGULATION**

This regulation and syllabus shall take effect from the academic year 2020–2021 for students who are admitted to the first year of the Programme during the academic year 2020–2021 and thereafter.

**20. GRADING**

Once the marks of the cumulative CIA and ESE are available, they will be added. The marks thus obtained will then be graded as per details given below:

**Marks and Grades:**

The following table gives the marks grade points, letter grades and classification to indicate the performance of the candidate.



| Range of Marks | Grade Points | Letter Grade | Description  |
|----------------|--------------|--------------|--------------|
| 90–100         | 9.0–10.0     | O            | Outstanding  |
| 80–89          | 8.0–8.9      | D+           | Excellent    |
| 75–79          | 7.5–7.9      | D            | Distinction  |
| 70–74          | 7.0–7.4      | A+           | Very Good    |
| 60–69          | 6.0–6.9      | A            | Good         |
| 50–59          | 5.0–5.9      | B            | Average      |
| 40–49          | 4.0–4.9      | C            | Satisfactory |
| 00–39          | 0.0          | U            | Re-appear    |
| ABSENT         | 0.0          | AAA          | ABSENT       |

$C_i$  = Credits earned for course  $i$  in any semester

$G_i$  = Grade Point obtained for course  $i$  in any semester

$n$  = Semester in which such course were credited

**Grade point average (for a Semester):**

**Calculation of grade point average semester-wise and part-wise is as follows:**

$$\text{GRADE POINT AVERAGE [GPA]} = \frac{\sum C_i G_i}{\sum C_i}$$

Sum of the multiplication of grade points and credits earned

$$\text{GPA} = \frac{\text{Sum of the multiplication of grade points and credits earned}}{\text{Total Credits Earned}}$$



Sum of the credits of the \_\_\_\_\_ courses in a semester

### Calculation of Cumulative Grade Point Average (CGPA) (for the entire programme):

The Cumulative Grade Point Average (CGPA) of a candidate who has passed all the examinations will be computed as follows;

$$\text{CUMULATIVE GRADE POINT AVERAGE [CGPA]} = \frac{\sum n \sum i C_{ni} G_{ni}}{\sum n \sum i C_{ni}}$$

$$\text{GPA} = \frac{\text{Sum of the multiplication of grade points and credits earned in the entire program}}{\text{Sum of the credits of the courses of the entire program}}$$

### 21. Classification of Successful Candidates

A candidate who passes all the examinations and securing following CGPA and Grades shall be declared as follows:

| CGPA                        | GRADE | CLASSIFICATION OF FINAL RESULT |
|-----------------------------|-------|--------------------------------|
| 9.5–10.0                    | O+    | First Class – Exemplary        |
| 9.0 and above but below 9.5 | O     |                                |
| 8.5 and above but below 9.0 | D++   | First Class with Distinction   |
| 8.0 and above but below 8.5 | D+    |                                |
| 7.5 and above but below 8.0 | D     |                                |
| 7.0 and above but below 7.5 | A++   | First Class                    |
| 6.5 and above but below 7.0 | A+    |                                |



|                             |    |              |
|-----------------------------|----|--------------|
| 6.0 and above but below 6.5 | A  | Second Class |
| 5.5 and above but below 6.0 | B+ |              |
| 5.0 and above but below 5.5 | B  |              |
| 4.5 and above but below 5.0 | C+ | Third Class  |
| 4.0 and above but below 4.5 | C  |              |

## 22. Ranking

A candidate who qualifies for the B.Sc. Zoology, passing all the Examinations in the first attempt within the minimum period prescribed for the Programme from the date of admission to the Programme and secures first or second class shall be eligible for ranking and such ranking will be confined to the candidates qualified in the B.Sc. Zoology, programme to a maximum of 10 ranks..

## 23. CONFERMENT OF THE DEGREE

No candidate shall be eligible for conferment of the Degree unless he/she has undergone the prescribed Programme of study for a period of not less than six semesters in an Institution approved by and affiliated to the Periyar University and earns has passed the Examinations as have been prescribed.

## 24. TRANSITORY PROVISION

Candidates who have undergone the Programme of Study prior to the Academic Year 2020–2021 will be permitted to take the Examinations under those Regulations for a period of six years i.e. up to and inclusive of the Examination of April 2026. Thereafter, they will be permitted to take the Examination only under the Regulations in force at that time.



# PROGRAMME SYLLABUS

| Program: B.Sc. Zoology |                               |                          |   |                           |
|------------------------|-------------------------------|--------------------------|---|---------------------------|
| <b>Core – VIII</b>     | <b>Course Code: 21UZO6C08</b> |                          | <b>Course Title: Ecology and Ethology</b> |                           |
| <b>Semester VI</b>     | <b>Hours/Week</b><br>5        | <b>Total Hours</b><br>75 | <b>Credits</b><br>5                       | <b>Total Marks</b><br>100 |

## Course Objectives





1. To know the fundamental principles that governs the functioning of the environment.
2. To understand the concept of ecosystem and balance of nature.
3. To assess the relationship between environment and organisms.
4. To study the learning process of animals and their behavioral changes.

### UNIT-I

Environment – Abiotic factors – Atmosphere and temperature. Limiting factors – Leibig's law and Shelford's law. Biotic factors - Inter specific animal relationship (Symbiosis, Mutualism, and Commensalism). Biogeochemical cycle – Oxygen – Carbon – Nitrogen and Phosphorus.

### UNIT-II

Ecosystem – Structure and functions – Food chain – Food web – Ecological pyramids. Community – Definition – Types – Characteristics – Stratification – Niche – Ecotone and Edge effect. Ecological succession – Types – Pattern – Significance.

### UNIT-III

Habitat – Lentic. Marine – Stratification - Intertidal shores – Deep Sea. Terrestrial – Desert. Ecological pollution – Air – Water-Noise and Thermal Pollution.

### UNIT-IV

Ethology – Definition – History – Scope. Learning behavior – Types – Neural mechanism. Chronobiology – Biological clock - Circadian rhythm. Visual communication – Postures and gestures of humans.

### UNIT-V

Pheromones and behaviour. Echolocation in Bats. Territorial behaviour of animals. Speech – Language development in Bonobo and Chimpanzees.

### Text Books

1. Agarwal V K (2002). Simplified course in B.Sc., Zoology – Ecology and Ethology.
2. Rastogi V B and Jayaraj M S (1998). Animal Ecology and Distribution of Animals, Kedar Nath Ram Nath Publishers, Meerut.
3. Saharia V B (2009). Wildlife in India. Nataraj Publications, Dehradun.



4. Verma P S and Agarwal V K (2011). Environmental Biology, Rastogi Publication, Meerut.

### Reference Books

1. Eugene P Odum and Gary W Barrett (2005). Fundamentals of Ecology, (5<sup>th</sup>Edn), Cengage Learning Publishers.
2. Gundevia H S and Hare Govind Singh (2013). A Textbook of Animal Behavior, (7<sup>th</sup>Edn) S. Chand Publishing, New Delhi.
3. Rastogi V B and Jayaraj M S (1998). Animal Ecology and Distribution of Animals, Kedar Nath Ram Nath Publishers, Meerut.
4. Sanji Chattopadhyay (2012). Life Evolution, Adaptation and Ethology, (3<sup>rd</sup>Edn), Books and Allied Pvt. Ltd., Kolkata.

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Defined the information and services that improve our natural environment and human lives.   | K1              |
| CO2       | Explain the relationship between predators and pre   | K3              |
| CO3       | Explain the importance of evolution for animal behaviour.  | K3              |
| CO4       | Investigate roles as broadly-educated leaders that have strong collaboration skills and can communicate effectively to address environmental issues. | K6              |

– Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

### Mapping of COs with POs



| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|----------|-----|-----|-----|-----|-----|
| CO1      | S   | S   | M   | M   | L   |
| CO2      | S   | S   | S   | M   | M   |
| CO3      | S   | S   | M   | S   | L   |
| CO4      | S   | S   | M   | M   | L   |

S – Strong M – Medium L – Low

| Program: B.Sc. Zoology |                 |                        |              |                         |
|------------------------|-----------------|------------------------|--------------|-------------------------|
| Core – IX              |                 | Course Code: 21UZO6C09 |              | Course Title: Evolution |
| Semester<br>VI         | Hours/Week<br>5 | Total Hours<br>75      | Credits<br>5 | Total Marks<br>100      |

### Course Objectives

1. To obtain the knowledge of animal behaviour.
2. To understand the concept of biological clock and circadian rhythm.
3. To students can learn the processes of origin of life.

#### **UNIT-I**

Introduction, Historical aspects of Evolutionary Concept – Origin of life – Geological time Scale. Living Fossils – Peripatus and Archaeopteryx.

#### **UNIT-II**

Evidences of Evolution – Morphological – Anatomical – Embryological and Biochemical.

#### **UNIT-III**

**Theories of Evolution:** Lamarckism Neo – Lamarckism – Darwinism – Neo- Darwinism  
Modern concept of natural selection – Species Concept – Origin of species and Isolating Mechanisms. Theories of evolution De Vries – Mutation theory.

#### **UNIT-IV**



Convergent and Parallel evolution – Micro and macro evolution – Adaptive radiation in mammals – Mimicry and colouration. Phylogenetic Trees of Invertebrates and Vertebrates.

### UNIT- V

Evolution in Horse – Elephant – Man and Future Evolution of Human.

#### Text Books

1. Arumugan N (2017). Organic Evolution, Saras. Publication. Kanniyakumari
2. Gopalakrishnan T S, IttaSambasivaiah, KamalakaraRao A P (1970). Principles of Organic Evolution, Pearl Publications, Madras.
3. Veer BalaRastogi (2016). Organic Evolution, RamnathPublishers.

#### Reference Books

1. Dobzhansky (1977). Evolution, W.H. Freeman and Co. San FrancisCO.
2. Dowdeswell W H (1956). The mechanism of Evolution, Helmann, London.
3. Gupta P K (1988). Cytology, Genetics & Evolution (5<sup>th</sup>Edn) Rastogi Publications Shivaji Road, Meerut, India.
4. Huxley J (1942). Evolution, The modern synthesis, Harpers N.Y.
5. Mayr E L (1963). Animal Species and Evolution, Harvad Uni., Press.
6. Minkoff E C (1983). Evolutionary Biology, Addition Wesley Publishers.

#### Course Outcomes (COs)

On successful completion of the course, the students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Get knowledge about the chronology of animals.      | K1              |
| CO2       | Understand the modern synthetic theory of evolution | K2              |
| CO3       | Apply the reproductive behavior of animals          | K3              |
| CO4       | Analyze the significance of geological time scale   | K4              |

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create**

Mapping of COs with POs

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|----------|-----|-----|-----|-----|-----|
| CO1      | S   | S   | S   | M   | M   |
| CO2      | S   | S   | M   | M   | S   |
| CO3      | S   | M   | M   | S   | S   |
| CO4      | S   | S   | S   | M   | S   |

S – Strong M–Medium L –Low

| Program: B.Sc. Zoology |            |                        |         |                                     |
|------------------------|------------|------------------------|---------|-------------------------------------|
| Core – X               |            | Course Code: 21UZO6C10 |         | Course Title: Developmental Biology |
| Semester VI            | Hours/Week | Total Hours            | Credits | Total Marks                         |
|                        | 5          | 75                     | 5       | 100                                 |

Course Objectives

1. To get knowledge about theories of development and gametogenesis.
2. To study the process of fertilization and cleavage of animals.
3. To understand the embryonic developmental stages and extra embryonic nutrition of animals.

**UNIT-I**

**Gametogenesis:** Spermatogenesis – Structure and types of mammalian sperm. Oogenesis, Structure of Ovum. Fertilization – Physico – Chemical changes in fertilization and its significance-Parthenogenesis.

**UNIT-II**

Types of Eggs and egg membranes - Cleavage – Planes and patterns of cleavage. Morulation, Blastulation in Frog and Chick – Gastrulation in Frog and Chick and Fate map.

**UNIT-III**

Organogenesis – Brain and Eye formation in frog. Metamorphosis in Frog and Insect – Hormonal



Control of metamorphosis in insects. Foetal membranes in chick and Mammals and Placenta in Mammals.

#### UNIT-IV

Gradient theory. Nuclear transplantation in Amphibians. Embryonic induction. Organizer – Types and experimental evidences. Regeneration in invertebrates (Planaria) and Chordates (Frog).

#### UNIT- V

Infertility – Cause and methods of treatment – Embryo splitting and Test Tube Baby. Twins – Identical and non-identical. Artificial insemination – Super Ovulation techniques and IVF.

#### Text Books

1. Arumugam N (2010). A text book of Embryology, Saras Publications. Kanniyakumari
2. Verma P S and V K Agarwal (2012). Chordate Embryology, S. Chand Company Ltd., New Delhi.

#### Reference Books

1. Balinsky B I (1981). Introduction to Embryology, Holt Saunders International, New York.
2. Berril N J (1986). Developmental Biology, Tata McGraw-Hill Publication, New Delhi.
3. Bodemes C W (1968). Modern Embryology, Holt Rinebert Winston, New York.
4. Ebert J C (1965). Interacting systems in Development, Holt Rainbart and Winston, New York.
5. Gilbert S F (2009). Developmental Biology, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
6. Kalthoff K (1996). Analysis of Biological Development, McGraw-Hill Publishers,
7. Needham J (1945). A History of embryology, Burgess, Minneapolis. New York.
8. Rayam CP (1961). An outline of developmental Physiology, (1<sup>st</sup> Edn.), Bergman, London.
9. Rough R (1945). Experimental Embryology, Burgess, Minneapolis.
10. Wolpert L (2007). Principles of Development, Oxford Publication.

#### Course Outcomes (COs)

On successful completion of the course, the students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Study the laws and theories of development and gametogenesis. | K1              |



|            |   |    |
|------------|---|----|
| <b>CO2</b> | Understand the process and different methods of fertilization.  | K2 |
| <b>CO3</b> | Apply the knowledge on various developmental stages of animals. | K3 |
| <b>CO4</b> | Analyze the importance and knowledge on embryonic nutrition.    | K4 |

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create**

**Mapping of COs with POs**

| <b>PO<br/>CO</b> | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> |
|------------------|------------|------------|------------|------------|------------|
| <b>CO1</b>       | S          | S          | S          | M          | M          |
| <b>CO2</b>       | S          | S          | S          | M          | M          |
| <b>CO3</b>       | S          | M          | M          | S          | S          |
| <b>CO4</b>       | S          | S          | M          | M          | L          |
| <b>CO5</b>       | S          | M          | M          | L          | L          |

**S – Strong**

**M–Medium**

**L –Low**

| <b>Program: B.Sc. Zoology</b>    |                         |                               |                      |  |
|----------------------------------|-------------------------|-------------------------------|----------------------|--|
| <b>Group-B<br/>Elective – II</b> |                         | <b>Course Code: 21UZO6E02</b> |                      | <b>Course Title: Immunology<br/>and Microbiology</b> |
| <b>Semester<br/>VI</b>           | <b>Hours/Week<br/>5</b> | <b>Total Hours<br/>75</b>     | <b>Credits<br/>3</b> | <b>Total Marks<br/>100</b>                           |

**Course Objectives**

1. To update basic knowledge on microorganisms.
2. To understand the economic importance of microbes in relation to agriculture, industry and medicine.
3. To analyze and inculcate the fundamental knowledge on immune system and immunological responses to antigens.

**UNIT- I**



## IMMUNOLOGY

Lymphoid organs (Primary and Secondary) – Cells of the immune system (Lymphocytes - Macrophages – Eosinophil - Basophil and Neutrophils) – Antigen. Presenting cells (Mast cells and platelets) – Types of Immunogloblins and their function.

### UNIT- II

Types of antigen and antibody reaction – Hypersensitivity (Immediate and delayed). Auto immune diseases (Classification and common auto immune diseases) Immunity (innate - and acquired) – Immunization (active and passive).

### UNIT- III

#### Microbiology

History and scope of microbiology – Classification of microbes – Structure of Bacteria(*E-coli*) – Structure of virus (T4 phage) – Sterilization – Bacterial Growth (Methods – Rate and Growth curve) Different types of culture Media – Bacterial culture Techniques and Culture methods.

### UNIT- IV

**Food spoilage:** Bread – Meat – Vegetables. Food poisoning – Food preservation and food additives Bacteriological examination of milk: Grading milks –Milk product – Milk borne diseases.

### UNIT -V

**Food borne diseases:** Microbial food poisoning by Salmonella and *Clostridium botulinum*(Botulism). Measures to prevent microbial food poisoning. Food infection – Food borne diseases – Diarrhoea – Dysentery – Typhoid and Cholera.

**Water borne diseases:** Hepatitis - Gastro enteritis – Camphlobacter – Diarrhoes, Gardialamblia - Cryptosporidiosis Cholera.

**Air borne diseases:** Common cold – Tuberculosis – Pneumonia – Diphtheria.

#### Text Books

1. Arumugam N. (2008) Microbiology & Immunology, Saras Publication, Nagercoil, Tamilnadu, India.
2. Verma P S, Tyagi and Agarwal (1997). Microbiology, Chand & Company Ltd.

#### Reference Books

1. Dubey R C and Maheswari D K (2006). A Text Book of Microbiology, Cambridge University Press.





2. Mani A, Selvaraj A M, Narayanan L M and Arumugam, N (2007). Microbiology, SarasPublications.
3. Mount (2004). Bioinformatics.CBS Publication.
4. Ryan K J & Ray C G (2004). Medical Micro Biology. TaTa-McGrawhill Publisher.
5. Stephen Misener & Stphen A Krawetz (2003). Bioinformatics Methods and Protocols. Humana Press.

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

| CO Number | CO Statement  | Knowledge Level |
|-----------|---|-----------------|
| CO1       | Gain knowledge about culture techniques, staining and Microbiological examination of food stuffs. | K1              |
| CO2       | Acquire about immunological importance of animals.  | K2              |
| CO3       | Study the basic bioinformatics tools and it uses.   | K3              |
| CO4       | Know the global development in computer applications.   | K4              |

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create**

### Mapping of COs with POs

| PO \ CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | S   | S   | M   | M   | S   |
| CO2     | M   | S   | S   | S   | M   |
| CO3     | S   | S   | S   | S   | M   |
| CO4     | M   | M   | S   | S   | S   |

**S – Strong**

**M–Medium**

**L –Low**



| Program: B.Sc. Zoology |                 |                        |              |                                       |
|------------------------|-----------------|------------------------|--------------|---------------------------------------|
| SBEC – V               |                 | Course Code: 21UZO6S05 |              | Course Title: Public Health & Hygiene |
| Semester<br>VI         | Hours/Week<br>2 | Total Hours<br>30      | Credits<br>2 | Total Marks<br>100                    |

### Course Objectives

1. To inculcate knowledge on health education and lifestyles.
2. To create awareness about the importance of environment for healthy life.
3. To educate the students in relation to health education programmes of public importance.
4. To impart awareness on public health and hygiene.
5. To create knowledge on health education.

#### **UNIT-I**

Introduction to food. Composition and nutritive value of Cereals (Rice, Wheat, Millets, Ragi, Pearl millet). Nutritional deficiency disease – Anaemia, Scurvy

#### **UNIT-II**

Composition and medical value of Ginger, Black pepper and Turmeric. Dental Care and eye care

#### **UNIT-III**

Communicable diseases – Dengue fever, Malaria, Amoebiasis, Viral fever and AIDS.

#### **UNIT-IV**

Non-communicable diseases – Stroke, Diabetes, Obesity and Cancer

#### **UNIT-V**

Awareness on Diarrhea, Alcoholism, Smoking, Tobacco chewing, Ulcer and Jaundice

#### **Text Books**

1. Chatwick R (2003). Functional Foods, Springer.



2. Guthrie A H (1986). Introductory Nutrition, (6<sup>th</sup>Edn), The C.V. Mosby Company.
3. Longree K (1973). Food Service Sanitation, John Wiley and Sons, New Delhi.
4. Mary K Schmidl & Theodore P Labuza (2000). Essential of Functional Foods Culinary and Hospitality Industry Publications Services.
5. Robinson C H (1998). Normal and the Therapeutic Nutrition, The Oxford and IBH Publishing Co., London.
6. Srilakshmi B (1977). Dietetics, New Age International (P) Ltd., Chennai.
7. Srilakshmi (1998). Food Science, New Age International Ltd., Chennai.
8. Murgesh. N. (2008). Health Education and Community Pharmacy. Sathya Publishers, Madurai

### Reference Books

1. Dubey R C and Maheswari D K (2007). Text Book of Microbiology, S. Chand & co. Publ. New Delhi–India.
2. Park and Park (1995). Text book of Preventive and Social Medicine, Banarsidas Bhanot Publ., Jodhpur-India.
3. Singh H and Rastogi P (2009). Parasitology, Rastogi Publ. India.
4. Verma S (1998). Medical Zoology, Rastogi Publications, Meerut- India.
5. Jill Varnes and Stephen. D C. (2000). Health. Bud Getchell, Rurtypipin. Health and Company, Massachusetts.

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Get knowledge about the concept of health.                                   | K1              |
| CO2       | Understand the role of Nutrition in Man.                                     | K2              |
| CO3       | Study various environmental pollution and diseases and their impacts on Man. | K3              |
| CO4       | Create awareness on prevention and control of diseases.                      | K6              |



K1 – Remember, K2 – Understand, K3 –  
– Analyze, K5 – Evaluate, K6 – Create

Apply, K4

| PO \ CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|---------|-----|-----|-----|-----|-----|
| CO1     | S   | S   | M   | S   | M   |
| CO2     | S   | S   | M   | S   | M   |
| CO3     | S   | M   | S   | S   | S   |
| CO4     | S   | S   | M   | S   | M   |

**Mapping of COs with POs**

S – Strong

M–Medium

L –Low

| Program: B.Sc. Zoology |            |                        |         |                               |
|------------------------|------------|------------------------|---------|-------------------------------|
| SBEC – VI              |            | Course Code: 21UZO6S06 |         | Course Title: Poultry Science |
| Semester VI            | Hours/Week | Total Hours            | Credits | Total Marks                   |
| VI                     | 2          | 30                     | 2       | 100                           |

**Course Objectives**

1. To impart training on Modern Poultry Farming Technology
2. To create knowledge on self-employment opportunity.

**UNIT-I**

History and importance of Poultry farming, Role of the Poultry in rural development, employment potential– Economics and contribution to national productivity–Egg production, manure as by-product. Physiology of poultry birds with reference to digestive and Reproductive system.

**UNIT-II**

Breeds of poultry birds and scientific methods of breeding Hybrid and cross breed. Indian and exotic selecting chicks and parents for production factors in selection–Hatching– selecting eggs



for hatching– Maintenance of temperature and humidity sterilization of room during hatching and separation and selling.

### UNIT-III

Poultry house and equipment- space requirement –Types of house–Number of birds– Equipment for feeding–Protection from enemies and Adverse conditions.

### UNIT-IV

Nutrition of Poultry birds– Requirement according to age feed formulation–Classification of feed stuffs- Milling by products–Availability of raw materials and their cost-Food grinders and mixtures, use of antibiotics

### UNIT-V

Brooding and rearing- Sexing– Vaccination-Natural and artificial breeding–types of brooding, temp. Requirement culling. De breaking of poultry–Characters of good layers and broilers–rearing of chicks.

### Text Books

1. Keith Wilson (2007). A Hand book of poultry practice. (2<sup>nd</sup>Edn), Agrobios (India), Jodhpur.
2. Norris Elye (2005). The Poultry Science L.C.R. Biotech books.Delhi.

### Reference Books

1. Banerjee C C (1992). Poultry III Edition.
2. Gnanamani M R (1978). Poultry Keeping, Deepana Publications.
3. Shukla G S and Upadhyay V B (2004). Economic Zoology, Rastogi Publication, Meerut-India.
4. Sing R A (1996). Poultry production.Kalyan publishers.

### Course Outcomes (COs)

On successful completion of the course, the students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Get knowledge about the importance of poultry farming  | K1              |
| CO2       | Understand significant diseases in poultry production. | K2              |



|            |   |    |
|------------|---|----|
| <b>CO3</b> | Apply the knowledge in types of incubators for poultry breeding | K3 |
| <b>CO4</b> | Evaluate the quality of poultry meat and eggs.                  | K5 |

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create**

| <b>PO</b><br><b>CO</b> | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> |
|------------------------|------------|------------|------------|------------|------------|
| <b>CO1</b>             | S          | S          | S          | M          | M          |
| <b>CO2</b>             | S          | S          | M          | M          | M          |
| <b>CO3</b>             | S          | M          | S          | M          | S          |
| <b>CO4</b>             | S          | S          | M          | M          | S          |

**Mapping of COs with POs**

**S – Strong**

**M–Medium**

**L –Low**



| Program: B.Sc. Zoology      |                        |                               |                     |   |
|-----------------------------|------------------------|-------------------------------|---------------------|---|
| <b>Core Practical – III</b> |                        | <b>Course Code: 21UZO6P03</b> |                     | <b>Course Title: Animal Physiology- Genetics and Biochemistry</b> |
| <b>Semester</b><br>V        | <b>Hours/Week</b><br>3 | <b>Total Hours</b><br>45      | <b>Credits</b><br>4 | <b>Total Marks</b><br>100   |

### Course Objectives

1. To understand the identification of Nitrogenous excretory products.
2. To make the students understand various principles of heredity.
3. To create the knowledge about the application of genetic principles in different populations.
4. To acquire skill of analyzing carbohydrates and amino acids.
5. To provide practical knowledge about the characterization of lipids.
6. To learn the methodology of separation of amino acids by paper chromatography.

### **I. Major Practicals**

1. Amylase activity in relation to pH in humansaliva.
2. Ciliary activity in fresh water mussels(Q10).
3. Estimation of the rate of O<sub>2</sub> consumption in fish/Crab with reference to the bodyweight.
4. Estimation of uric acid – Caraway'smethod.

### **II. Minor Practicals**

1. Qualitative analysis of Carbohydrate, Proteins andFats.
2. Identification of Nitrogenous excretoryproducts.
3. Estimation of Phosphorus - Fiske &Subbarrowmethod.

### **III. Spotters**

Observation of common Mutants of Drosophila – Kymograph – Sphygmomanometer – pH Meter – Haemocytometer and Mono and Dihybrid test cross (Diagrammatic representation) and Paper chromatography.

### **Submission of Practical Record**

**Course Outcomes(COs)**

On successful completion of the course, the students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Student gain the fundamental knowledge of animal Physiology  | K1              |
| CO2       | Understanding the basic concept of various physiologically Instruments                                     | K2              |
| CO3       | Analyse of basic concept of genetics and law of inheritance  | K4              |
| CO4       | Practice the qualitative analysis of different carbohydrates and amino acid through individual experiments | K5              |
| CO5       | Calculate iodine number of lipids, thereby characterizing them   | K6              |

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create**

**Mapping of COs with POs**

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|----------|-----|-----|-----|-----|-----|
| CO1      | M   | S   | S   | S   | S   |
| CO2      | S   | S   | S   | S   | S   |
| CO3      | M   | M   | M   | S   | S   |
| CO4      | S   | S   | M   | M   | S   |
| CO5      | S   | S   | S   | S   | M   |

**S – Strong**

**M–Medium**

**L –Low**





| Program: B.Sc. Zoology     |                     |                               |                  |  |
|----------------------------|---------------------|-------------------------------|------------------|--|
| <b>Core Practical – IV</b> |                     | <b>Course Code: 21UZO6P04</b> |                  | <b>Course Title: Ecology and Ethology, Evolution and Developmental Biology and MLT</b> |
| <b>Semester VI</b>         | <b>Hours/Week 3</b> | <b>Total Hours 45</b>         | <b>Credits 4</b> | <b>Total Marks 100</b>   |

### Course Objectives

1. To study the eco factors on the morphology and distribution of organisms.
2. To study the different development stages of chick embryos.
3. To study the application of information sciences (mathematics, statistics and computer sciences) in biology.
4. To study the impact of eco factors on the morphology and distribution of organisms.

#### **I. Major Practicals**

1. Estimation of Dissolved oxygen content in the given water sample (Winkler method).
2. Estimation of salinity in given water sample.
3. Study of Marine/Freshwater Planktons.

#### **II. Minor Practicals**

1. Estimation of urine sugar.
2. Bleeding time.
3. Clotting time.

#### **III. Spotters**

Slides of different developmental stages of chick embryos (24, 48, 72, 96 Hrs.) Slides of blastula and gastrula of frog (Morula - Early gastrula - Yolk plug stage - Late gastrula) Placenta of Sheep / Pig / Rat. Fossils any two Description and uses of autoclave - Hot air oven - Incubator - Centrifuge - pH meter - Colorimeter.

**Submission of Field report.**

**Submission of Practical Record not.**



### Course Outcomes (COs)

On successful completion of the course, the students will be able to

| CO Number | CO Statement   | Knowledge Level |
|-----------|--|-----------------|
| CO1       | Get practical knowledge about the species identification, diversity and their ecological significance. | K1              |
| CO2       | Understand about the species diversity and water pollution due to anthropogenic activity.              | K2              |
| CO3       | Apply practical knowledge on plankton analysis.  | K3              |
| CO4       | Analyze about practical and filed knowledge in relation to environment management.                     | K4              |

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create**  
Mapping of COs with POs

| PO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 |
|----------|-----|-----|-----|-----|-----|
| CO1      | M   | S   | S   | S   | M   |
| CO2      | M   | M   | M   | S   | S   |
| CO3      | S   | M   | S   | S   | S   |
| CO4      | S   | S   | S   | M   | S   |

**S – Strong**

**M–Medium**

**L –Low**