# MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

**(An Autonomous College)**

Affiliated to Periyar University, Salem | Accredited by **NAAC** with '**A**' Grade

Recognized by **UGC** under Section 2(f) & 12 (B)

ESTD-1994

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (Autonomous)

A UNIT OF VANETRA GROUP

Learn. Lead

## DEGREE OF BACHELOR OF SCIENCE

Learning Outcomes - Based Curriculum Framework

- Choice Based Credit System

## Syllabus for B.Sc.,Zoology

**(Semester Pattern)**

(For Candidates admitted from the academic year 2023-2024 and onwards)

# Regulation and Syllabus for

# B.Sc., Zoology

*(With effect from the Academic Year 2023-24)*

**Vision:**

To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, thereby nurturing a generation of committed, Knowledgeable and socially responsible citizens.

**Mission:**

*To Ensure State of the world learning experience

*To Espouse value based Education

*To Empower rural education

*To Instill the sprite of entrepreneurship and enterprise

*To create are source pool of socially responsible world citizens

## QUALITY POLICY

To Seek – To Strive – To Achieve greater heights in Arts and Science, Engineering, Technological and Management Education without compromising on the Quality of Education.

## DEPARTMENT OF ZOOLOGY

**Vision:**

*To nourish and cherish the lofty values of life through sterling scientific practices and imbibe a spirit that converts the Society to be hale and healthy

**Mission:**

* To magnetize the students to modern frontiers of Science

* To develop an ardent vigour for deciphering the fathom of nature and its rich biodiversity

## PREAMBLE

The Department of Zoology is a constituent substance of the faculty of Science, Muthayammal college of Arts and Science (Autonomous). Since its beginning in 2016, it has been preeminent community for learning in all parts of Creature Sciences in India. Beginning, showing endeavors in the division were custom fitted to prepare understudies driving them to a B.Sc. degree with exceptional consideration regarding every one of the understudies transporters. The department gives tremendous measure of individual consideration, moral help, consolation, vast graciousness and legitimate approach to having a place in turning into the best zoologist would be very good to go for life after school days. The department incorporate different parts of Animal Physiology, Entomology, Marine Biology, Aquaculture, Immunology, Developmental Science, Cell Biology, Environmental Biology, Parasitology and Poultry Science. Aside from teaching, the personnel has been distributing papers in peer-checked on research diaries. All the staff individuals are capable and acquire their Ph.D., Degree. Zoology lab gives the extraordinary commonsense information through the ICT technique for addresses, individual dealing with functional's in Lab and field works. Utilizing the Digi frog programming for virtual analyzation to the UG first year under studies. The point of the virtual analyzation is to safeguard the downfall quantities of creatures. Situation offices will be given and co-coordinated by the Arrangement cell.

## PROGRAMME LEARNING OUTCOME

## NATURE AND EXTENT OF THE PROGRAMME

The undergraduate programme in Zoology is the first level of College or University degree in the Country as in several other parts of the world. After obtaining this degree, a Zoologist may enter into the job market or opt for undertaking further higher studies in the subject. After graduation the students may join Industry, Academia, or Public Health departments and play their role as Zoologists in a useful manner contributing their knowledge to the welfare of the society. Thus the Undergraduate level degree in Zoology must prepare the students for all these objectives. The LOCF curriculum has been developed encompassing all the diversified aspects of Zoology with reasonable depth of knowledge and skills as to specialize them in the various aspects of the subject. It also equips them with the expected

professional expertise.

## AIM OF THE PROGRAMME

The aim of the Undergraduate degree in Zoology is to make students knowledgeable about the various basic concepts in a wide ranging context which involve the use of knowledge and skills of Zoology. Their understanding, knowledge and skills in Zoology needs to be developed through teaching learning process in the class, practical skills through the laboratory work, their presentation and articulation skills, exposure to industry and interaction with industry experts.

## GRADUATE ATTRIBUTES

The students graduating in this degree must have an intricate knowledge of the fundamentals of Zoology as applicable to wide ranging contexts. They should have the appropriate skills of Zoology so as toper form their duties as Zoologists. They must be able to analyze the problems related to Zoology and come up with most suitable solutions. As Zoology is an interdisciplinary subject the students might have to take inputs from other areas of expertise. So the students must develop the spirit of team work. Zoology is a very dynamic subject and practitioners might have to face several newer problems. To this end, the Zoologists must be trained to be innovative to solve such newer problems. Several newer developments are taking place in Zoology. The students are trained to pick up leads and see the possibility of converting these into products through entrepreneurship. Furthermore, the students are made to interact with industry experts so that they may able to see the possibility of their transition into entrepreneurs. They are also made aware of the requirements of developing a Zoology enterprise by having knowledge of patents, copyrights and various regulatory processes to make their efforts a success.

Besides attaining the attributes related to the Profession of Zoology, the graduates in this discipline should also develop ethical awareness which is mandatory for practicing a scientific discipline including ethics of working in a laboratory and ethics followed for scientific publishing of their research work in future. The students graduating in Zoology should also develop excellent communication skills both in the written as well as spoken language which is indispensable for them to pursue higher studies from some of the best and internationally acclaimed Universities and Research Institutions spread across the globe.

GA1 Analytical Reasoning

GA2 Critical Thinking

GA3 Problem Solving Skills

GA4 Communication Skills

GA 5LeadershipQuality

GA 6Teamwork

GA 7 Lifelong Learning

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Graduates will be able to promote learning environment to meet the industry expectation

PEO2: Graduates will be incorporated the critical thinking with Good Communication and Leadership skills to become a self-employed

PEO3: Graduates will be uphold the human values and environmental sustenance for the betterment of the society.

## PROGRAMME OUTCOMES (POs)

PO1: Graduates will acquire dynamic skills through proper perception of the course Objectives that leads to scientific and analytical comprehension of the concepts.

PO2: Graduates will focus on sustainable goals that might bring about spherical developments

PO3: Graduates will infuse a spirit converging on bricking a team work, interpersonal and administrative skills to think critically and execute effectively

PO4: Graduates will apply reasoning appropriately to scale the humps in learning And solute them to the core.

PO5: Graduates will engage the skills obtained in independent and collaborative Learning as a perennial process.

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO-1: To gather the relevant information about on Invertebrata, chordate, cell and molecular biology, genetics, developmental biology, physiology, biochemistry, Immunotechnology, evolutionary biology and neurobiology

PSO-2: Correlated the systematic view of animals and basic concepts of chemistry, genetics, physiology, etc.

PSO-3: Understand the application and economic values of dairy, sericulture, apiculture, Vermitechnology and poultry science.

PSO-4: To gain the knowledge of techniques and tools on animal biotechnology, medical laboratory techniques, biostatistics and bioinformatics.

PSO-5: To contribute the knowledge and economic development to the society

## REGULATIONS (2023-2024)

### 1. DURATION OF THE PROGRAME

**1.1.** Three years(six semesters)

**1.2.** Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from June to November of each year and the even semesters from December to May of each year.

**1.3.** There shall be not less than 90 working days for each semester.

### 2. ELIGIBILITY FOR ADMISSION

**2.1.** Candidate for admission to the first year of the degree of Bachelor of Science Course shall be required to have passed the Higher secondary examination (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an Examination accepted by the Syndicate, Subject to such conditions may be prescribed therefore shall be permitted to appear and qualify for B.Sc., degree examination in Zoology.

### 3. CREDIT REQUIRMENTS AND ELIGIBILITY FOR AWARD OF DEGREE

**3.1.** A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a College affiliated to the University for a period of not less than three academic years and passed the examinations of all the Six Semesters prescribed earning a minimum of 140 credits as per the distribution given in Regulation for Part I, II, III, IV & V and also fulfilled such other conditions as have been prescribed there of.

## 4. COURSE OF STUDY,CREDITS AND SCHEME OF EXAMINATION

**4.1.** The Course Components and Credit Distribution shall consist of the following:(Minimum Number of Credits to be obtained)

| Part Wise Distribution | Study Components | Credit Distribution |
|---|---|---|
| PART I | Tamil or Other Languages | 12 |
| PART II | English | 12 |
| PART III | Core, Allied, Elective and Project Courses | 91 |
| PART IV | i. Basic Tamil/Advanced Tamil/NME | 04 |
| | ii. Soft Skill Courses/SBEC | 10 |
| | iii. Environmental Studies | 02 |
| | iv. Value Education | 02 |
| | v. Internship | 02 |
| | vi. Foundation Course | 02 |
| | vii. Professional Competency Skills | 02 |
| PART V | Extension Activity | 01 |
| Total Credits | | 140 |

## 4.2 DETAILS OF COURSE OF STUDY OF PARTS I-V

**4.2.1 PARTI:** Tamil and Other Languages Hindi or French at the option of candidates and according to the syllabus and text-books prescribed from time to time:

**4.2.2 PART II:** English: According to the syllabus and text-books prescribed from time to time

**4.2.3 PART III:** Core, Allied Project and Elective Courses : As prescribed by the concerned Board of Studies

**4.2.4 PART IV:**

**i. Basic Tamil / Advanced Tamil / NME:**

a. Students who have not studied Tamil up to XII STD and have taken any Language other than Tamil in Part I shall take Basic Tamil comprising of Two Courses (level will be at 6$^{th}$Standard).
b. Students who have studied Tamil up to XII STD and have taken any Language other than Tamil in Part – I shall take Advanced Tamil comprising of Two Courses.
c. Students who have studied Tamil up to XII STD and also have taken Tamil in Part–I shall take Non-Major Elective comprising of Two Courses.

i. Soft Skill Courses/SBEC
ii. Environmental Studies
iii. Value Education
iv. Internship
v. Foundation Course
vi. Professional Competency Skills(Online)

**4.2.5 PART V: Extension Activity:**

Students shall be awarded a maximum of 1 Credit for Compulsory Extension Service. All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games) Retract / Youth Red Cross or any other Service Organizations in the College and shall have to put in compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the College before 31st March in a year. If a student lacks 40 hours attendance in the first year, he or she shall have to compensate the same during the subsequent years.

Those students who complete minimum attendance of 40 hours in one year will get 'half-a- credit and those who complete the attendance of 80 or more hours in Two Years will get 'one credit'. Literacy and Population Education and Field Work shall be compulsory components in the above extension service activities.

### 4.3. Inclusion of the Massive Open Online Courses (MOOCs) available on SWAYAM and NPTEL

**4.3.1** Students can choose the MOOC Course Available on SWAYAM and NPTEL under Core, Elective or Soft skill category. He/ she will be awarded degree only after producing valid certificate of the MOOC course for credit Mobility

## 5. REQUIREMENTSFORPROCEEDINGTOSUBSEQUENTSEMESTER

**5.1Eligibility:** Students shall be eligible to go to subsequent semester only if the yearn sufficient attendance as prescribed by the Periyar University.

**5.2. Attendance:** All Students must earn 75% and above of attendance for appearing for the End Semester Examination.(Theory/Practical)

**5.3. Condonation of shortage of attendance:** If a Student fails to earn the minimum attendance (Percentage stipulated), the Principals shall condone the shortage of attendance up to a maximum limit of 10% (i.e. between 65% and above and less than75%) after collecting the prescribed fee for Theory / Practical examination separately, towards the condonation of shortage of attendance. Such fees collected and should be remitted to the University.

**5.4. Non-eligibility for condonation of shortage of attendance:** Students who havesecuredlessthan65%butmorethan50%ofattendanceareNOTELIGIBLEforcondonation of shortage of attendance and such Students will not be permitted to appear for the regular examination, but will be allowed to proceed to the nextyear/nextsemesteroftheprogramandtheymaybepermittedtotakenextUniversity examination by paying the prescribed condonation fee

**5.5. Detained students for want of attendance:** Students who have earned less than 50% of attendances hall not be permitted to proceed to the next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion offinal semester of the course, by paying the fee for the break of study as prescribed by the College from time to time.

**5.6. Condonation of shortage of attendance for married women students:** In respect of married women students undergoing UG programs, the minimum attendance for condonation (Theory/Practical) shall be relaxed and prescribed as 55% instead of 65% if they conceive during their academic career. Medical certificate from the Doctor (D.G.O) from the Government Hospital and the prescribed fee along with attendance details shall be forwarded to the college to consider the condonation of attendance mentioning the category

**5.7. Zero Percent (0%) Attendance:** The Students, who have earned 0% of attendance, have to repeat the program (by rejoining) without proceeding to succeeding semester and they have to obtain prior permission from the College / University immediately to rejoin the program.

**5.8 Transfer of Students and Credits:** The strength of the credits system is that it permits inter Institutional transfer of students. By providing mobility, it enables individual students to develop their capabilities fully by permitting them to move from one Institution to another in accordance with their aptitude and abilities by obtaining necessary permission from the university.

**5.8.1** Transfer of Students is permitted from one Institution to another Institution for the same program with same nomenclature.

Provided, there is a vacancy in the respective program of Study in the Institution where the transfer is requested.

Provided the Student should have passed all the courses in the Institution from where the transfer is requested.

**5.8.2** The marks obtained in the courses will be converted and grades will be assigned as per the College norms.

**5.8.3** The transfer students are eligible for classification.

**5.8.4** The transfer students are not eligible for Ranking, Prizes and Medals.

**5.8.5** Students who want to go to foreign Universities up to two semesters or Project Work with the prior approval of the Departmental/College Committee are allowed to get transfer of credits and marks which will be converted in to Grades as per the University norms and are eligible to get CGPA and Classification; they are not eligible for Ranking, Prizes and Medals.

**5.9** Students are exempted from attendance requirements for online courses of the College and MOOC's.

## 6. EXAMINATION AND EVALUATION

**6.1. Register for all subjects:** Students shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

**6.2.** Marks for Internal and End Semester Examinations for PART I, II, III and IV

| Category | Theory | Practical |
|---|---|---|
| **Internal Assessment** | 25 | **40** |
| **End semester Examination** | **75** | **60** |

### 6.3. Procedure for Awarding Internal Marks

### Internal Examination Marks-Theory

| Components | Marks |
|---|---|
| **CIA I & II** | **15** |
| **Attendance** | **5** |
| **Assignment / Quiz** | **5** |
| Total | **25** |

### 6.4 Awarding Marks for Attendance (out of 5)

| Percentage of Attendance | Marks |
|---|---|
| **Below 60%** | 0 marks |
| **60% to 75%** | 3 marks |
| **75% to 90%** | 4 marks |
| **Above 90%** | 5 marks |

### 6.5 Components for Practical CIA.

| Components | Marks |
|---|---|
| **CIA-I** | **15** |
| **CIA- II** | **15** |
| **Observation Note** | **05** |
| **Attendance** | **5** |
| **Total** | **40** |

## 6.6 Components for Practical ESE.

| Components | Marks |
|---|---|
| **Completion of Experiments** | **50** |
| **Record** | **05** |
| **Viva voce** | **05** |
| **Total** | **60** |

## 6.7 Guidelines for Value Education Yoga and Environmental Studies(Part IV)

6.7.1. The Course Value Education Yoga is to be treated as 100% CIA course which is offered in V Semester for I year UG students.

6.7.2. The Course Environmental Studies is to be treated as 100% CIA course which is offered in IV Semester for I year UG students.

**6.7.3** Total Marks for the Course = 100

| Components | Marks |
|---|---|
| **Two Tests (2x30)** | **60** |
| **Field visit and report (10+10)** | **20** |
| **Two assignments (2x10)** | **20** |
| Total | **100** |

The passing minimum forth is courseis40%

**6.7.3** Incase, the candidate fails to secure 40% passing minimum, he / she may have to reappear for the same in the subsequent odd/even semesters.

## 6.8 Internship/Industrial Training, Mini Project and Major Project Work

| Internship/ Industrial Training | | Mini Project | Major Project Work | | |
|---|---|---|---|---|---|
| Components | Marks | Marks | Components | | Marks |
| CIA*2 | | | CIA<br>a) Attendance<br>b) Review /Work Diary*1 | 10Marks<br>30Marks | 40 |
| Work Diary | 25 | - | | | |
| Report | 50 | 50 | | | |
| Viva-voce | 25 | 50 | | | |
| Examination | | | ESE*2<br>a) Final Report 40 Marks ) Viva-voce 20 Marks | | 60 |
| Total | 100 | 100 | Total | | 100 |

*1. Review is for Individual Project and Work Diary is for Group Projects (Group consisting of minimum 3 and maximum 5)

*2 Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

## 6.9 Guidelines for Professional Competency Skill-Online Mode (Part IV)- Online Exam 3 hours

| Components | Marks |
|---|---|
| **100 Objective Type Questions100*1= 100 Marks** | **100** |

Objective type Questions from Question Bank.

- The passing minimum for this paper is 40%
- Incase, the candidate fails to secure 40% passing minimum, he / she may have

to reappear for the same in the subsequent semesters.

| QUESTION PAPER PATTERN FOR CIA I, II AND ESE | |
|---|---|
| (3 HOURS ) | **MAXIMUM:75 Marks** |
| SECTION-A (Objective Type)<br>**Answer ALL Questions**<br>ALL Questions Carry EQUAL Marks | (10x1=10 marks) |
| SECTION-B (Either or Type)<br>**Answer ALL Questions**<br>ALL Questions Carry EQUAL Marks | (5x5=25 marks) |
| SECTION-C (Either or Type)<br>**Answer ALL Questions**<br>ALL Questions Carry EQUAL Marks | (5x8=40 marks) |
| (Syllabus for CIA-I2.5 Unit, Syllabus for CIA-II All 5 Unit) | |

## 6.10 PASSING MINIMUM

6.10.1. There shall be no passing minimum for Internal.

6.10.2. For external examination, passing minimum shall be 40% [Forty Percentage] of the maximum marks prescribed for the course for each Course / Practical / Project and Viva-Voce.

6.10.3 In the aggregate [External / Internal ] the passing minimum shall be of 40%.

6.10.4 He/ She shall be declared to have passed the whole examination, if he/she passes in all the Courses and Practical wherever prescribed as per the scheme of the examinations by earning 140 CREDITS in Part I, II, III, IV& V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 credit to qualify for the Degree.

### 6.11 SUPPLIMENTARY EXAMINATION:

Supplementary Examinations is conducted for the students who appeared in the final semester examinations. Eligible criteria for appearing in the Supplementary Examinations are as follows:

**6.11.1 Eligibility:** A Student who is having arrear of only one theory course in any of the semester or two theory course in the Final semester of the UG degree programme alone is eligible for Supplementary Examinations.

**6.11.2 Non-eligibility for those completed the program:** Students who have completed their Program duration but having arrears are not eligible to appear for Supplementary Examinations.

### 6.12 RETOTALLING, REVALUATION AND PHOTOCOPY OF THE ANSWERSCRIPTS:

**6.12.1Re-totaling:** All UG Students who appeared for their Semester Examinations are eligible for applying for re-totaling of their answer scripts.

**6.12.2 Revaluation:** All current batch Students who have appeared for their Semester Examinations are eligible for Revaluation of their answer scripts. Passed out candidates are not eligible for Revaluation.

**6.12.3 Photo copy of the answer scripts:** Students who have applied for revaluation can apply for the Photocopy of answer scripts by paying prescribed fee.

## 7. CLASSIFICATION OF SUCCESSFUL STUDENTS

7

| 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** |

7.1 Computation of Grade Point Average (GPA) in a Semester, Cumulative Grade Point Average(CGPA)and Classification

GPA for a Semester:=∑iCiGi,∑iCi

That is, GPA is the sum of the multiplication of grade points by the credits of the courses divided by the sum of the credits of the courses in a semester.

CGPA for the entire programme: = ∑n∑iCniGni ,∑n∑iCni That is, CGPA is the sum of the multiplication of grade points by the credits of the entire programme divided by the sum of the credits of the courses of the entire programme

Where,

Ci = Credits earned for course I in any semester,

Gi = Grade Points obtained for course in any semester = Semester in which such courses were credited.

### 7.2 Letter Grade and Classification

| CGPA | GRADE | CLASSIFICATIONOFFINALRESULT |
|---|---|---|
| 9.5-10.0 | O+ | First Class-Exemplary* |
| 9.0 and above but below9.5 | O | |
| 8.5 and above but below9.0 | 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 below7.5 | A++ | First Class |
| 6.5 and above but below7.0 | A+ | |
| 6.0 and above but below6.5 | A | |
| 5.5 and above but below6.0 | B+ | Second Class |
| 5.0 and above but below5.5 | B | |
| 4.5 and above but below5.0 | C+ | Third Class |
| 4.0 and above but below4.5 | C | |
| 0.0 and above but below4.0 | U | Re-appear |

*The Students who have passed in the first appearance and with in the prescribed semester of the UG Programme (Major, Allied and Elective courses only) are eligible.

## 8. RANKING

Students who pass all the examinations prescribed for the Program in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking I,II and III.

## 9. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAM TO QUALIFY FOR ADEGREE

**9.1.** A Student who for whatever reasons is not able to complete the program within the normal period (N) or the Minimum duration prescribed for the programme, may be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree.(Time Span=N +2 years for the completion of programme.)

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# MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637 408

B.Sc., ZOOLOGY abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards
Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

| S.No. | Study Components | Part | Sem I | | Sem II | | Sem III | | Sem IV | | Sem V | | Sem VI | | No.of Courses | Total Credit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | No.of Course | Credit | No.of Course | Credit | No.of Course | Credit | No.of Course | Credit | No.of Course | Credit | No.of Course | Credit | | |
| 1 | LANGUAGE - I | I | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | | | | | 4 | 12 |
| 2 | LANGUAGE - II | II | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | | | | | 4 | 12 |
| 3 | DISCIPLINE SPECIFIC COURSE(DSC)-THEORY | III | 1 | 5 | 1 | 4 | 2 | 7 | 1 | 5 | 3 | 13 | 3 | 14 | 11 | 47 |
| 4 | DSC - PRACTICAL | III | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 6 | 18 |
| 5 | GENERIC ELECTIVE COURSES (GEC)-THEORY | III | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | | | | | 4 | 12 |
| 6 | GEC PRACTICAL | III | | | 1 | 2 | | | 1 | 2 | | | | | 2 | 4 |
| 7 | DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE) | III | | | | | | | | | 2 | 6 | | | 2 | 6 |
| 8 | PROJECT WORK | III | | | | | | | | | | | 1 | 4 | 1 | 4 |
| 9 | INTERNSHIP | IV | | | | | | | | | 1 | 2 | | | 1 | 2 |
| 10 | Professional competency skill | IV | | | | | | | | | | | 1 | 2 | 1 | 2 |
| 11 | SKILL ENHANCEMENT COURSES (SEC) | IV | | | 1 | 2 | 2 | 4 | 2 | 4 | | | | | 5 | 10 |
| 12 | NON MAJOR ELECTIVE COURSES (NMEC) | IV | 1 | 2 | 1 | 2 | | | | | | | | | 2 | 4 |
| 13 | FOUNDATION COURSE (FC) | IV | 1 | 2 | | | | | | | | | | | 1 | 2 |
| 14 | ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)-EVS | IV | | | | | | | 1 | 2 | | | | | 1 | 2 |
| 15 | ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)-VALUE EDUCATION - YOGA | IV | | | | | | | | | 1 | 2 | | | 1 | 2 |
| 16 | EXTENSION ACTIVITY | V | | | | | | | | | | | 1 | 1 | 1 | 1 |
| | **Cumulative Credits** | | **7** | **21** | **8** | **22** | **8** | **23** | **9** | **25** | **8** | **26** | **8** | **24** | **47** | **140** |

| | |
|---|---|
| **Total No. of Subjects** | 47 |
| **Marks** | **4800** |
| **PART** | **No.of Credits** |
| PART - I | 12 |
| PART - II | 12 |
| PART - III | 91 |
| PART - IV | 24 |
| PART - V | 1 |
| Grand Total | **140** |
| Extra Credit (2+2) | 4 |
| | **144** |

# MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(Autonomous)
Rasipuram - 637 408

B.Sc., ZOOLOGY abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards
Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

| S.No. | PART | STUDY COMPONENTS | COURSE_CODE | TITLE OF THE COURSE | Hrs./W | | CREDIT POINTS | MAX.MARKS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lect. | Lab. | | CIA | ESE | TOTAL |
| **SEMESTER - I** | | | | | | | | | | |
| 1 | I | LANGUAGE - I | 23M1UFTA01 | TAMIL-I | 6 | - | 3 | 25 | 75 | 100 |
| 2 | II | LANGUAGE - II | 23M1UFEN02 | ENGLISH-I | 6 | - | 3 | 25 | 75 | 100 |
| 3 | III | DSC THEORY - I | 23M1UZOC01 | INVERTEBRATA | 5 | - | 5 | 25 | 75 | 100 |
| 4 | III | DSC PRACTICAL - I | 23M1UZOP01 | PRACTICAL : INVERTEBRATA | - | 3 | 3 | 40 | 60 | 100 |
| 5 | III | GEC THEORY - I | 23M1UBOA01 | ALLIED : BOTANY I | 4 | - | 3 | 25 | 75 | 100 |
| 6 | III | GEC PRACTICAL-I | 23M2UBOAP1 | PRACTICAL: ALLIED BOTANY | - | 2 | - | 40 | 60 | 100 |
| 7 | III | NMEC - I | | NMEC-I | 2 | | 2 | 25 | 75 | 100 |
| 8 | IV | FC THEORY - I | 23M1UZOFC1 | ECONOMIC ZOOLOGY | 2 | | 2 | 25 | 75 | 100 |
| | | | | **TOTAL** | **25** | **5** | **21** | **230** | **570** | **800** |
| **SEMESTER - II** | | | | | | | | | | |
| 1 | I | LANGUAGE - I | 23M2UFTA02 | TAMIL - II | 6 | - | 3 | 25 | 75 | 100 |
| 2 | II | LANGUAGE - II | 23M2UFEN02 | ENGLISH - II | 6 | - | 3 | 25 | 75 | 100 |
| 3 | III | DSC THEORY - II | 23M2UZOC02 | CHORDATA | 5 | - | 4 | 25 | 75 | 100 |
| 4 | III | DSC PRACTICAL - II | 23M2UZOP02 | PRACTICAL : CHORDATA | - | 3 | 3 | 40 | 60 | 100 |
| 5 | III | GEC THEORY - II | 23M2UBOA02 | ALLIED -BOTANY II | 3 | - | 3 | 40 | 60 | 100 |
| 6 | III | GEC PRACTICAL-I | 23M2UBOAP1 | PRACTICAL: ALLIED BOTANY | - | 2 | 2 | 40 | 60 | 100 |
| 7 | III | NMEC - II | | NMEC-II | 2 | | 2 | 25 | 75 | 100 |
| 8 | IV | SEC THEORY - I | 23M2UZOS01 | BASICS OF MARINE BIOLOGY | 2 | | 2 | 25 | 75 | 100 |
| | | | | **TOTAL** | **25** | **5** | **22** | **245** | **555** | **800** |
| **SEMESTER - III** | | | | | | | | | | |
| 1 | I | LANGUAGE - I | 23M3UFTA03 | TAMIL - III | 6 | - | 3 | 25 | 75 | 100 |
| 2 | II | LANGUAGE - II | 23M3UFEN03 | ENGLISH - III | 6 | - | 3 | 25 | 75 | 100 |
| 3 | III | DSC THEORY - III | 23M3UZOC03 | CELL BIOLOGY | 3 | - | 3 | 25 | 75 | 100 |
| 4 | III | DSC THEORY - IV | 23M3UZOC04 | GENETICS | 3 | - | 3 | 25 | 75 | 100 |
| 5 | III | DSC PRACTICAL - III | 23M3UZOP03 | PRACTICAL : CYTOLOGY AND GENETICS | | 3 | 3 | 40 | 60 | 100 |
| 6 | III | GEC THEORY - III | 23M3UCHA01 | ALLIED- CHEMISTRY I | 4 | - | 3 | 25 | 75 | 100 |
| 7 | III | GEC PRACTICAL-II | 23M4UCHAP1 | PRACTICAL: ALLIED CHEMISTRY | - | 2 | - | 40 | 60 | 100 |
| 8 | IV | SEC THEORY - II | 23M3UZOS02 | AQUARIUM KEEPING | 1 | - | 2 | 25 | 75 | 100 |
| 9 | IV | SEC THEORY - III | 23M3UZOS03 | BIOCOMPOSTING FOR ENTREPRENEURSHIP | 2 | - | 2 | 25 | 75 | 100 |
| | | | | **TOTAL** | **25** | **5** | **22** | **255** | **645** | **900** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **SEMESTER - IV** | | | | | | | | | | |
| 1 | I | LANGUAGE - I | 23M4UFTA04 | TAMIL - IV | 6 | - | 3 | 25 | 75 | 100 |
| 2 | II | LANGUAGE - II | 23M4UFEN04 | ENGLISH - IV | 6 | - | 3 | 25 | 75 | 100 |
| 3 | III | DSC THEORY - V | 23M4UZOC05 | DEVELOPMENTAL BIOLOGY | 5 | - | 5 | 25 | 75 | 100 |
| 4 | III | DSC PRACTICAL - IV | 23M4UZOP04 | PRACTICAL :DEVELOPMENTAL BIOLOGY | | 3 | 3 | 40 | 60 | 100 |
| 5 | III | GEC THEORY - IV | 23M4UCHA02 | ALLIED-CHEMISTRY II | 4 | - | 3 | 25 | 75 | 100 |
| 6 | III | GEC PRACTICAL-II | 23M4UCHAP1 | PRACTICAL: ALLIED CHEMISTRY | - | 2 | 2 | 40 | 60 | 100 |
| 7 | IV | SEC THEORY - IV | 23M4UZOS04 | FOOD NUTRITION AND HEALTH | 2 | - | 2 | 25 | 75 | 100 |
| 8 | IV | SEC THEORY - V | 23M4UZOS05 | RADIATION BIOLOGY | 2 | - | 2 | 25 | 75 | 100 |
| 9 | IV | AECC - ENVIRONMENTAL STUDIES * | 23M4UEVS01 | ENVIRONMENTAL STUDIES | - | - | 2 | 100 | - | 100 |
| | | * Self Study | | **TOTAL** | **25** | **5** | **25** | **330** | **570** | **900** |
| **SEMESTER - V** | | | | | | | | | | |
| 1 | III | DSC THEORY - VI | 23M5UZOC06 | EVOLUTIONARY BIOLOGY | 5 | - | 5 | 25 | 75 | 100 |
| 2 | III | DSC THEORY - VII | 23M5UZOC07 | ANIMAL PHYSIOLOGY | 5 | - | 4 | 25 | 75 | 100 |
| 3 | III | DSC THEORY - VIII | 23M5UZOC08 | ENVIRONMENTAL BIOLOGY | 5 | - | 4 | 25 | 75 | 100 |
| 4 | III | DSC PRACTICAL - V | 23M5UZOP05 | PRACTICAL:ENVIRONMENTAL TOXICOLOGY AND PHYSIOLOGY | - | 3 | 3 | 40 | 60 | 100 |
| 5 | III | DSE THEORY - I | 23M5UZOE01 | Elective - I | 5 | | 3 | 25 | 75 | 100 |
| 6 | III | DSE THEORY - II | 23M5UZOE02 | Elective - II | 5 | - | 3 | 25 | 75 | 100 |
| 7 | IV | AECC - VALUE EDUCATION | 23M5UVED01 | YOGA | 2 | - | 2 | 100 | - | 100 |
| 8 | IV | INTERNSHIP | 23M5UZOIS1 | INTERNSHIP | - | - | 2 | 100 | - | 100 |
| | | | | **TOTAL** | **27** | **3** | **26** | **365** | **435** | **800** |
| **SEMESTER - VI** | | | | | | | | | | |
| 1 | III | DSC THEORY - IX | 23M6UZOC09 | ANIMAL BIOTECHNOLOGY | 6 | - | 5 | 25 | 75 | 100 |
| 2 | III | DSC THEORY - X | 23M6UZOC10 | MICROBIOLOGY | 6 | - | 5 | 25 | 75 | 100 |
| 3 | III | DSC THEORY - XI | 23M6UZOC11 | IMMUNOLOGY | 6 | - | 4 | 25 | 75 | 100 |
| 4 | III | DSC PRACTICAL -VI | 23M6UZOP06 | PRACTICAL: BIOTECHNOLOGY | - | 3 | 3 | 40 | 60 | 100 |
| 5 | III | PROJECT WORK | 23M6UZOPR1 | PROJECT WORK | 7 | | 4 | 40 | 60 | 100 |
| 6 | IV | PROFESSIONAL COMPETENCY SKILL | 23M6UZOOE1 | ZOOLOGY FOR COMPETETIVE EXAMINATION | 2 | | 2 | 100 | | 100 |
| 7 | IV | EXTENSION ACTIVITY | 23M6UEXA01 | EXTENSION ACTIVITY | - | - | 1 | - | - | - |
| | | | | **TOTAL** | **27** | **3** | **24** | **255** | **340** | **600** |
| | | | | **OVER ALL TOTAL** | **154** | **26** | **140** | **1550** | **3150** | **4800** |
| 1 | V | EXTRA CREDIT COURSE - ONLINE | | MOOC Courses offered in SWAYAM/NPTEL | - | - | 2 | - | - | - |
| 2 | V | VALUE ADDED COURSE | | | - | - | 2 | - | - | - |

**HOD** **MEMBER SECRETARY ACADEMIC COUNCIL** **PRINCIPAL**

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOC01** | **INVERTEBRATA** | **DSC THEORY - I** | **I** | **5** | **5** | **-** | **-** | **5** |
| **Objective** | Students will understand the habitat, adaptation, organization and taxonomic status of invertebrates and recall certain morphological attributes and physiological processes that are distinct and significant to each Phyla | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Protozoa:** Introduction to Classification, taxonomy and nomenclature. General characters and classification of Phylum Protozoa up to classes. Type study - Paramecium and Plasmodium - Parasitic protozoans (Entamoeba, Trypanasoma &Leishmania) **Porifera:** General characters and classification up to Classes. Type study-Sycon - Canal system in sponges | K2 | 12 |
| II | **Coelenterata:** General characters and classification up to classes – Type study - Obelia Corals and coral reefs - Polymorphism - Economic importance. **Platyhelminthes:** General characters and classification of up to classes. Type study – Taenia solium – Parasitic adaptations. Host-parasitic interactions of Helminth parasites. | K2 | 12 |
| III | **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. **Annelida:** General characters and classification up to Classes. Type study – Nereis , Metamerism Modes of life in Annelids. | K2 | 12 |
| IV | **Arthropoda:** General characters and classification of Phylum Arthropoda up to Classes. Detailed study: Penaeus indicus. Insect pests of Agricultural Importance. Pest of rice: Rice stem borer (Scirpophaga incertulas) – Pest of Sugarcane: The shoot borer (Chilo infuscatellus) – Pest of coconut: The rhinoceros beetle (Oryctes rhinoceros). Principles of Integrated Pest Management. | K3 | 12 |
| V | **Mollusca**: General characters and classification of Phylum Mollusca up to Classes. Detailed study: Pila globosa. Foot and torsion in Mollusca. **Echinodermata:** General characters and classification of Phylum Echinodermata up to Classes. Detailed study: Asterias. Water vascular system in Echinodermata – Larval forms of Echinoderms. Introduction of artificial intelligence (AI) technologies - Beekeeping using Machine learning. | K6 | 12 |

| | | | |
|---|---|---|---|
| **Course Outcome** | **CO1:** Gathering the basic concepts of invertebrate animals and recall its structure and functions. | K2 | |
| | **CO2:** Illustrate and examine the systemic and functional morphology of various groups of invertebrate. | K2 | |
| | **CO3:** Differentiate and classify the animal's mode of life in various taxa and estimate the biodiversity | K2 | |
| | **CO4:** Compare and distinguish the various physiological processes and organ systems in lower animals. | K3 | |
| | **CO5:** Infer and integrate the parasitic and economic importance of invertebrate animals. | K6 | |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Ekambaranatha Iyer (2000) A Manual of Zoology, 10th edition, Viswanathan, S., Printers & Publishers Pvt Ltd.<br>2. Jordan.E.L and Verma.P.S (1995) Invertebrate Zoology Revised Edn., S.Chand and Co. Ltd.<br>3. Kotpal R.L (2011), Modern Text Book of Zoology – Invertebrates, Rastogi Publications. |
| **Reference Books** | 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<br>2. Ekambaranatha Ayyar, M. & Ananthakrishnan,T.N (2010 ) Manual of Zoology Vol-I (Invertebrata) Part I & II Vishwanathan pubication.<br>3. Dhami P.S. and Dhami J.K (2012), Invertebrate Zoology 5th edition S. Chand & Co., New Delhi. |
| **Website Link** | 1. https://www.nationalgeographic.com/animals/invertebrates/<br>2. https://www.nio.org/<br>3. https://bit.ly/3kABzKa |

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|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOC01** | **INVERTEBRATA** | | | | **DSC THEORY - I** | **I** | **5** | **5** | **-** | **-** | **5** |

**CO-PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | L | S | S | M | S | M | S |
| CO2 | S | M | M | M | M | S | S | S | S | L |
| CO3 | S | L | S | L | L | M | S | S | L | M |
| CO4 | S | S | M | S | S | S | M | S | S | M |
| CO5 | S | M | S | M | S | S | S | S | M | S |
| Level of Correlation between CO and PO | L-LOW | | | | | M-MEDIUM | | | S-STRONG | |

| | |
|---|---|
| **Tutorial Schedule** | - |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. AMARESAN** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOP01** | **PRACTICAL : INVERTEBRATA** | **DSC PRACTICAL - I** | **I** | **3** | **-** | **-** | **3** | **3** |
| **Objective** | Students will identify the different groups of invertebrate, dissect and display the internal organs and mount the mouthparts and scales of invertebrates and to know about the classification, adaptations. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| **Major Dissection** | Cockroach: Digestive system, Nervous system.<br>Earthworm: Viscera, Lateral hearts.<br>Prawn: Nervous system (including Appendages). | K2 | 12 |
| **Minor Dissection** | Mounting: Earthworm: Body setae; Pineal setae.<br>Freshwater muscle: Pedal ganglia.<br>Mouth parts - Honey Bee, House fly and Mosquito. | K3 | 12 |
| **Spotters** | i. **Protozoa**: Amoeba, Paramoecium, Entamoeba histolytica, Plasmodium vivax<br>ii. **Porifera**: Sycon, Spongilla, Spicules, Gemmule<br>iii. **Coelenterata**: Obelia – Colony & Medusa, Aurelia<br>iv. (**Platyhelminthes**: Planaria, Fasciola hepatica, Fasciola larval forms – Miracidium, Redia, Taenia solium<br>v. **Nemathelminthes**: Ascaris (Male & Female), Ancylostoma, Wuchereria<br>vi. **Annelida:** Nereis, Hirudinaria, Trochophore larva<br>vii. **Arthropoda:** Scorpion, Scolopendra, Sacculina, Limulus, Peripatus, Larvae - Nauplius, Mysis, Zoea | K3 | 12 |
| **Course Outcome** | **CO1:** Identify and label the external features of different groups of invertebrate and chordate animals. | K2 | |
| | **CO2:** Illustrate and examine the circulatory system, nervous system and reproductive system of invertebrate and chordate animals. | K3 | |
| | **CO3:** Differentiate and compare the structure, function and mode of life of various groups of animals. | K3 | |
| | **CO4:** To compare and distinguish the dissected | K3 | |

| | | |
|---|---|---|
| | internal organs of lower animals. | |
| | **CO5:** Prepare and develop the mounting procedure of economically important invertebrates and chordates. | K3 |

| **Learning Resources** | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Ekambaranatha Iyyar and T. N. Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai.<br>2. Ganguly, Sinha an d A dhikari , 2 0 11 . Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp. | | | |
| **Reference Books** | 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.<br>2. Barnes, R.D. (1982). Invertebrate Zoology, V Edition. Holt Saunders International Edition. | | | |
| **Website Link** | 1. https://nbb.gov.in/<br>2. https://www.agshoney.com/training.htm | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOP01** | **PRACTICAL : INVERTEBRATA** | | | **DSC PRACTICAL - I** | **I** | **3** | **-** | **-** | **3** | **3** |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | M | M | L | S | S | S | M | M |
| CO2 | M | L | S | L | M | S | S | M | L | S |
| CO3 | S | S | M | L | M | S | S | S | M | M |
| CO4 | S | M | S | M | L | S | S | S | S | S |
| CO5 | M | L | M | M | M | M | S | S | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | - |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Poster Presentation, Demonstration and Video presentation |
| **Assessment Methods** | CIA I, CIA II, Observation and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. SUGANYA** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M2UZOC02** | **CHORDATA** | **DSC THEORY - II** | **II** | **5** | **3** | **2** | **-** | **4** |

| **Objective** | Students will understand and able to distinguish the characteristic features of each subphylum and class. | | |
|---|---|---|---|
| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
| **I** | **General Characters and Classification of Phylum Chordata**: Origin of Chordata, Differences between non-chordates and chordates, General characters, Affinities and Systematic position of Hemichordata (Balanoglossus), Urochordata (Ascidia), Cephalochordata (Amphioxus). | K1 | 12 |
| **II** | **Prochordates and Agnatha**: Characteristics of subphylum vertebrata, Classification of Vertebrata upto Class level, Agnatha (Petromyzon), - Pisces (Scoliodon sorrakowah) General characters and classification, Origin of fishes, Affinities of Dipnoi - Types of scales and fins - Accessory respiratory organs - Air bladder - Parental care - Migration - Economic importance. | K2 | 12 |
| **III** | **Amphibia**: General characters and classification - Origin of Amphibia - Type study - Rana hexadactyla - Adaptive features of Anura, Urodela and Apoda - Neoteny in Urodela - Parental care in Amphibia. | K3 | 12 |
| **IV** | **Reptilia**: General characters and classification - Type study – (Calotes versicolor (endoskeleton of Varanus) Origin of reptiles and effects of terrestrialisation, Extinct reptiles. Snakes of India. Poison apparatus and biting mechanism of poisonous snakes - Skull in reptiles as basis of classification. | K3 | 12 |
| **V** | **Aves and Mammalia**: **Aves**: General characters and classification – Type study - Columba livia - Origin of birds, Flight adaptations, Migration. Introduction of AI techniques using the bird migration. **Mammalia**: General characters and classification - Type study - Rabbit - Adaptive radiation in mammals - Egg laying mammals, Marsupials, Flying mammals, Aquatic mammals, Dentition in mammals. | K6 | 12 |
| **Course Outcome** | **CO1:** Classify, Identify and recall the name and distinct features of different subphylum belonging to phylum Chordata. | K1 | |
| | **CO2:** Explain, and relate the origin, structural organization and evolutionary aspects of vertebrates. | K2 | |
| | **CO3:** Analyze, compare and distinguish the developmental stages and describe the important biological process. | K3 | |
| | **CO4:** Correlate the different modes of life and parental care among different vertebrates. | K3 | |

| | | |
|---|---|---|
| | **CO5:** Summarize the morphology and ecological adaptations in vertebrates and list out the economic importance. | K6 |

| **Learning Resources** | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Ayyar, E.K. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. II (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 891p.<br>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, 1151 pp. | | | |
| **Reference Books** | 1. Newman, H.H., 1981. The Phylum Chordata, Satish Book Enterprise, Agra – 282 003, 411 pp.<br>2. 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. 1065 pp. | | | |
| **Website Link** | 1. https://bit.ly/3cLjOqe<br>2. https://bit.ly/3KN5ABO<br>3. https://bit.ly/3BdNgyt | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M2UZOC02** | **CHORDATA** | | | **DSC THEORY - II** | **II** | **5** | **3** | **2** | **-** | **4** |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | M | S | L | S | S | S | L | M |
| CO2 | M | S | S | M | M | S | S | M | L | S |
| CO3 | S | M | M | L | M | S | M | S | M | M |
| CO4 | S | S | S | M | L | S | S | S | S | S |
| CO5 | M | L | M | M | M | M | S | S | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | Group Discussion, Quiz program, Model preparation and Kahoot app |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. AMARESAN** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc.-Zoology SyllabusLOCF-CBCSwitheffectfrom2023-2024Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M2UZOP02** | **PRACTICAL : CHORDATA** | **DSC PRACTICAL - II** | **II** | **3** | **-** | **-** | **3** | **3** |
| **Objective** | Students will identify the different groups of Chordata, dissect and display the internal organs and mount the scales of Vertebrates and to know about the classification, adaptations. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| **I Major Dissection** | **Frog** (Demo) / Fish: External features, Digestive system, Arterial system, Venous system. | K2 | 12 |
| **II Minor Dissection** | **Fish**: Placoid and Ctenoid scales, Frog: Hyoid apparatus and Brain (Demo). | K3 | 12 |
| **III Osteology** | **Frog:** Skull and lower jaw, Vertebral column, Pectoral girdle, Pelvic girdle, Forelimb, Hind limb. Pigeon - skull and lower jaw, synsacrum. | K3 | 12 |
| **IV Specimen and Slides** | **(i) Hemichordata:** Balanoglossus<br>**(ii) Protochordata:** Amphioxus<br>**(iii) Cyclostomata:** Petromyzon<br>**(iv) Pisces:** Channa, Pleuronectes, Hippocampus, Echieneis, Labeo, Catla. Scales: Placoid, Cycloid,Ctenoid<br>**(v)Amphibia:** Ichthyophis, Hyla, Bufo, Rana, Axolotal larva<br>**(vi).Reptilia:** Draco, Chemaeleon, Gecko, Viper russelli, Naja, ungarus, Crocodilus, Ptyas.<br>**(vii). Aves:** Archaeopteryx, Columba, Corvus, Pavo; Collection and study of different types of feathers: Quill, Contour, Filoplume, Down<br>**(viii).Mammalia:** Funambulus, Manis, Loris, Hedgehog. | K3 | 10 |
| **Course Outcome** | **CO1:** Identify and label the external features of different groups of chordate animals. | K2 | |
| | **CO2:** Illustrate and examine the Scales and hyoid apparatus of chordate animals. | K3 | |
| | **CO3:** Differentiate and compare the Skull and Jaw of various groups of animals. | K3 | |
| | **CO4:C**ompare and distinguish the Specimen and Slide of Different Chordates | K4 | |
| | **CO5:** Prepare and develop the mounting procedure of economically important chordates. | K5 | |

**Learning Resources**

| | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Ekambaranatha Iyyar and T. N. Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai.<br>2. Ganguly, Sinha and A dhikari , 2 0 11 . Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp. | | | |
| **Reference Books** | 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.<br>2. Barnes, R.D. (1982). Invertebrate Zoology, V Edition. Holt Saunders International Edition. | | | |
| **Website Link** | 1. https://nbb.gov.in/<br>2. https://www.agshoney.com/training.htm | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc-ZoologySyllabus LOCF-CBCSwitheffectfrom2023-2024Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | Course Type | | Sem. | Hours | L | T | P | C |
| 23M2UZOP02 | PRACTICAL : CHORDATA | | DSC PRACTICAL-II | | II | 3 | - | - | 3 | 3 |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | M | M | L | M | S | S | M | M |
| CO2 | M | S | S | L | S | S | S | M | L | S |
| CO3 | S | S | M | M | M | M | M | S | M | M |
| CO4 | S | M | S | L | S | S | S | S | S | S |
| CO5 | M | L | M | M | M | M | S | S | M | S |

| Level of Correlation Between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | 1. Practical Demonstration<br>2. Virtual dissection<br>3. Chart explanation<br>4. Observation of specimen |
| Assessment Methods | 1. Model Practical<br>2. Observation<br>3. Records |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr.D.AMARASAN | Dr. D. SUGANYA | Dr. S. SHAHITHA |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOC03** | **CELL BIOLOGY** | **DSC THEORY - III** | **III** | **3** | **3** | **-** | **-** | **3** |
| **Objective** | Students will gain the knowledge about structure and function of cellular components. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **CYTOMETRY**<br>History and scope of cell Biology.<br>**Micrometry**: Stage, ocular and camera lucida - Units of measurement - Microscope - Principles, functions and uses - Types: Light, Phase contrast and Electron microscope.<br>**Microtechnique methods** - Cell Fractionation, Homogenization, Centrifugation, Isolation of subcellular Components.<br>Staining - Vital Stains - Cytoplasmic and Nuclear Stains. | K4 | 7 |
| II | **Cell theory:**<br>Cell theory - Ultrastructure, Composition and Functions of Bacteria, Bacterial membrane, Viruses, Plant and Animal cell - Cytoplasm - Structure, Composition and Functions of Extracytoplasmic Structure - Cilia and Flagella - Cytoplasmic inclusions. | K4 | 7 |
| III | **Cell components (Animal cell):**<br>Structure, Composition and Functions of Plasma Membrane - Different Models, Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysosomes, Centrioles, Microtubules, Microfilaments, Mitochondria and Microsomes. | K4 | 7 |
| IV | **Nucleus:**<br>Ultrastructure, Composition and Functions of Nuclear Membrane, Nucleoplasm - Chromosomes - Heterochromatin and Euchromatin - Nucleolus - Nucleolus cycle - DNA and RNAs - Protein synthesis and regulation. | K5 | 7 |
| V | **Cell divisions and cell cycle:**<br>Amitosis, mitosis and meiosis and their significance.<br>**Cancer Biology** - Characteristics of cancer cells, types, Ageing of cells - Apoptosis and Stem cell studies.<br>***Current trends:** Alternative splicing in stem cell self renewal and differentiation. | K5 | 8 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Differentiate the cellular components using cytological tools and techniques. | K4 | |
| | **CO2:** Explain the theories of cells and their structure and function | K4 | |
| | **CO3:** Distinguish the structure and function of cellular organelles. | K4 | |

| | | | |
|---|---|---|---|
| | **CO4:** Evaluate the ultra structure and regulation of cellular processes. | K5 | |
| | **CO5:** Analyze the significance of cell division and their defects. | K5 | |

| **Learning Resources** | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Verma, P.S. and Agarwal, V.K. (2016). Cell Biology (Cytology, Biomolecules, Molecular Biology). S.Chand and Co. Ltd., Publisher, New Delhi.<br>2. Rastogi, V.B. Introductory cytology. Kedarnath Ramnath Publisher, Meerut.<br>3. Arumugam, N. (2019). Cell and Molecular Biology. Saras Publication, Nagercoil, Tamil Nadu. | | | |
| **Reference Books** | 1. Rastogi, S.C. (2019). Cell Biology. Fourth edition. New Age International Publishers, New Delhi.<br>2. De Robertis E.D.P. (2017). Cell and Molecular Biology. 8th edition. South Asian Publisher, India. | | | |
| **Website Link** | 1. http://www.microscopemaster.com/organelles.html<br>2. https://rsscience.com/cell-organelles-and-their-functions/ | | | |
| **Self-study material** | 1. https://bit.ly/3vUhAi6 | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOC03** | **CELL BIOLOGY** | | | **DSC THEORY-III** | **III** | **3** | **3** | **-** | **-** | **3** |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | M | M | S | S | M | S | S |
| CO2 | L | S | S | M | S | S | S | S | S | M |
| CO3 | S | S | S | M | S | M | S | L | M | S |
| CO4 | S | M | M | S | L | S | M | S | S | S |
| CO5 | S | S | S | S | S | M | S | S | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | - |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. AMERASAN** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOC04** | **GENETICS** | **DSC THEORY-IV** | **III** | **3** | **3** | **-** | **-** | **3** |
| **Objective** | Students will understand the structure and functions of nucleic acids; causes and effects of mutations; molecular basis of genetic variations in evolution. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Mendelian Genetics and Inheritance:**<br>Mendelian genetics: Mendelian experiments, laws of Mendel, Monohybrid, Dihybrid, back and test cross.<br>Interaction of genes: Incomplete dominance, co-dominance, complementary genes, supplementary genes, inhibiting genes, lethal genes and atavism.<br>Inheritance: Polygenic inheritance - skin colour; ABO blood groups - sex linked inheritance - eye colour in Drosophila, colour blindness and hemophilia in man. | K4 | 8 |
| II | **Linkage and Crossing Over**:<br>**Linkage**: Linked genes, complete and incomplete linkage.<br>**Crossing over**: molecular mechanisms of crossing over, kinds of crossing over, models of recombination.<br>**Chromosome mapping**: Interference and coincidence, haploid mapping, somatic cell hybridization. | K4 | 6 |
| III | **Cytogenetics**:<br>Variation in chromosome number and structure: position effect, chromosomal mutation and evolution.<br>Gene mutation: types, molecular basis of mutation, mutational hot spots, reversion; radiation and chemical agents as mutagens. | K3 | 6 |
| IV | **Human Genetics:**<br>**Human genetics**: Karyotype and ideogram; sex determination - Barr body technique, drumstick method; chromosomal abnormalities in humans, Pedigree analysis; diagnosis of genetic abnormalities.<br>**Population genetics and evolution**: gene pool, gene frequency and genotype frequency; Hardy-Weinberg law of equilibrium. | K4 | 8 |
| V | **Microbial and Molecular Genetics:**<br>Insertion elements, transposable elements, retroelements; integrons and antibiotic resistance cassettes; the lactose system and operon model, tryptophanoperon, role and relative positions of promoters and operators, feedback mechanism.<br>***Current trends:** Genomic Imprinting in Human Disease | K4 | 8 |
| | ***Self-study** | | |

| | | | | |
|---|---|---|---|---|
| **Course Outcome** | **CO1:**Illustrate the basis of inheritance and expression of genes. | | K4 | |
| | **CO2:**Correlate changes in genetic makeup and phenotypic changes in progeny. | | K4 | |
| | **CO3**: Articulate the causes of variations in genetic material and predict the effect in a population using different techniques. | | K3 | |
| | **CO4:** Explain the role of cellular processes and different genetic elements in the expression of genes. | | K4 | |
| | **CO5:** Compile the factors which contribute to changes in gene expression and specify the changes which contribute to evolution. | | K4 | |
| **Learning Resources** | | | | |
| **Text Books** | 1. Verma P.S and Agarwal V.K., (2006). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand and Company Ltd.<br>2. Guptha G. K. (2013). Genetics Classical to Modern, Rastogi publishers, Meerut.<br>3. Verma P. S. and V. K. Agarwal. (2018). Genetics, S. Chand and Company Pvt. Ltd., New Delhi.<br>4. Gardner, E.J., Simmons, M.J. and Snustad, D.P. (2006). Principles of Genetics. 8th edition. Wiley Publisher.<br>5. Rastogi, V.B. (2019). Genetics. Fourth Edition. Medtech Publisher. | | | |
| **Reference Books** | 1. Klug, W.S., Cummings, M.R. And Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.<br>2. Fletcher, H. And Hickey, I. (2015). Genetics. Iv Edition. Gs, Taylor and Francis Group, New York and London.<br>3. Derobertis, E. D. P and Robertis, E.M.F. (2017). Cell and Molecular Biology. 8th Edition, Lww.<br>4. Geoffrey, Mc. (2018). The Cell: A Molecular Approach. Eighth Edition, Oxford University Press, London.<br>5. David Freifelder. (2008). Microbial Genetics. Jones and Bartlett Publisher.<br>6. Sauvain Philip Hooper. (1992). Genetics. Hodder Wayland Publisher. | | | |
| **Website Link** | 1. https://bit.ly/3zoTt6B<br>2. https://bit.ly/2XAm7oa<br>3. https://bit.ly/3AB4bso<br>4. https://bit.ly/39pZSE4 | | | |
| **Self-study material** | 1. https://bit.ly/4dAt6zS | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M3UZOC04 | GENETICS | | | DSC THEORY-IV | III | 3 | 3 | - | - | 3 |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | L | S | S | S | S | S | S | S |
| CO2 | S | S | M | S | S | M | M | M | S | S |
| CO3 | M | S | S | M | S | S | S | S | S | S |
| CO4 | S | S | S | S | M | S | S | M | S | M |
| CO5 | S | S | M | M | S | S | S | S | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOP03** | **PRACTICAL: CYTOLOGY AND GENETICS** | **DSC PRACTICAL-III** | **III** | **3** | **-** | **-** | **3** | **3** |
| **Objective** | Students will interpret the organization of genomic material and to research theories of genetic inheritance | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| **Major** | Preparation and Identification of slides of Mitotic divisions with onion root tips.<br>Preparation and Identification of different stages of Meiosis in Grasshopper Testis.<br>Buccal epithelium (Barr body) preparation. | K3 | 12 |
| **Minor** | Staining and observation of polytene chromosomes in salivary glands of chironomous larva.<br>Karyotyping (with the help of photographs) – normal male and female karyotypes and study of karyotypes of different genetic syndromes.<br>Verification of the Mendelian laws of inheritance using coloured beads. Observation on genetic traits. | K4 | 12 |
| **Spotters** | Types of microtomes, Sectioning of Paraffin blocks. Staining of paraffin sections.<br>Principle and methods of Haematoxylin and Eosin staining.<br>Study of at least five types of Mutant Drosophila: Body color mutant - Ebony body and Yellow body. Wing mutant - Curly wing and Vestigial wing. Eye color mutant- Bar eye, White eye, Sepia eye. | K4 | 12 |
| **Course Outcome** | **CO1:** Describe, examine and interpret the organization of genomic material and to research theories of genetic inheritance. | K3 | |
| | **CO2:** Prepare samples of genetic molecules and to determine their purity, structure and characteristics. | K4 | |
| | **CO3:** Experiment with genomic preparations and devise techniques to distinguish genetic material in different organisms to survey biodiversity. | K3 | |
| | **CO4:** Assess the changes in genetic material and to predict and consider the consequences of those changes. | K4 | |
| | **CO5:** Report and justify the results of molecular, genetic and animal experiments in an accurate and meaningful manner. | K4 | |

| Learning Resources | |
|---|---|
| **Text Books** | 1. Chitra, K.Y. (2018). A Practical Manual of Ecology, Cytology, Genetics, Biochemistry, Physiology and Biostatistics. Agrobios Publications, India. 1st edition. |
| **Reference Books** | 1. Shrivastava, R., Prabha, R.C. and Mayuri, S. (2013). Practical manual on principles of genetics. Publisher: College of Agriculture, IGKV, RAaipur. |

| | | | | |
|---|---|---|---|---|
| **Website Link** | 1. https://bit.ly/49Nk8wb<br>2. https://bit.ly/3xKTWVz | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M3UZOP03 | PRACTICAL: CYTOLOGY AND GENETICS | | | DSC PRACTICAL - III | III | 3 | - | - | 3 | 3 |

**CO-PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | M |
| CO2 | S | S | M | M | S | S | S | S | S | S |
| CO3 | S | S | S | M | S | S | S | S | M | S |
| CO4 | S | S | S | S | S | S | S | S | S | M |
| CO5 | S | S | S | M | S | S | S | S | M | M |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, PPT Presentation and Video presentation |
| Assessment Methods | Model Practical, Observation, Records |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M4UZOC05** | **DEVELOPMENTAL BIOLOGY** | **DSC THEORY - V** | **IV** | **5** | **5** | **-** | **-** | **5** |
| **Objective** | Students will get the awareness about on theories, concepts and basics of Developmental Biology and Teratogenesis, *in vitro* fertilization, stem cells and amniocentesis to the students | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **GAMETOGENESIS AND FERTILIZATION**<br>Basic concepts of developmental biology. Spermatogenesis and Oogenesis. Structure and types of egg and spermatozoa, mammalian egg, egg membranes. Types of egg. Fertilization - Mechanism, theories and significance - Parthenogenesis. | K2 | 12 |
| II | **BLASTULATION AND GASTRULATION**<br>Planes and patterns, factors controlling cleavage - fate map and its construction. Blastulation - types of blastula. Morphogenetic movements - Gastrulation of frog and chick. | K3 | 12 |
| III | **ORGANOGENESIS**<br>Development of brain, eye and heart in frog. Development of nervous system in chick. Fetal membranes in chick. Development of pro, meso and metanephric kidneys. Placentation in mammals. | K4 | 12 |
| IV | **APPLIED EMBRYOLOGY**<br>Organizer concept - structure - mechanism of induction and competence. Nuclear transplantation.<br>Teratogenesis - Agent and mechanism.<br>Regeneration: Types - Events and factors. Embryonic stem cells and significance. Methods to culture embryo. | K4 | 12 |
| V | **HUMAN EMBRYOLOGY**<br>Reproductive organs, menstrual cycle and menopause - Pregnancy - trimesters - development.<br>Erythroblastosis fetalis - Twins - types. Infertility - causes - Test tube baby. Assisted reproductive technology - Embryo transfer - Amniocentesis.<br>***Current trends:** Artificial cells for therapeutic purposes - The control of Genetic Activity | K5 | 12 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Describe and illustrate the significance of cellular processes in embryonic development. | K2 | |

| | | | |
|---|---|---|---|
| | **CO2:** Relate the factors that contribute to the developmental process, construct fate maps and illustrate the steps in morphogenesis and organogenesis. | K3 | |
| | **CO3:** Correlate the involvement of specific cell types in the formation of specific organs and explain the importance of morphogenesis. | K4 | |
| | **CO4:** Distinguish between the different types of developmental mechanisms in various organisms and appraise the species-based differences in development. | K4 | |
| | **CO5:** Justify and validate the role of environment and genetics in influencing embryonic development. | K5 | |

| **Learning Resources** | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Wolpert, L. (2007). Principles of development. 3rd edition, Oxford University Press, New Delhi, India<br>2. Subramoniam, T. (2003). Developmental Biology. Narosa Publishing House, New Delhi, India.<br>3. Verma, P.S. and Agarwal, V. K. 2010. Chordate Embryology: Developmental Biology. S.Chand and Company, New Delhi, India. | | | |
| **Reference Books** | 1. Gilbert S.F. (2010). Developmental Biology, Sinauer Associates, Massachusetts, USA.<br>2. Balinsky, B.I. (1970). Introduction to Embryology, Philadelphia & London, UK.<br>3. Berril, N.J. (1971). Developmental Biology, McGraw Hill, New York, USA. | | | |
| **Website Link** | 1. https://bit.ly/3JgMUKG<br>2. https://bit.ly/3xAQPQh<br>3. https://bit.ly/4dashOn<br>4. https://bit.ly/43WPLSA | | | |
| **Self-study material** | 1. https://bit.ly/3U9bRwL | | | |
| | **L-Lecture** | **T-Tutorial** | **P-Practical** | **C-Credit** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M4UZOC05 | DEVELOPMENTAL BIOLOGY | | | DSC THEORY - V | IV | 5 | 5 | - | - | 5 |

**CO - PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | L | S | S | S | M | S | M | M | S | L |
| CO2 | M | S | S | S | L | S | L | M | S | S |
| CO3 | L | S | S | S | S | M | M | M | S | S |
| CO4 | M | S | S | S | S | S | L | M | M | S |
| CO5 | S | S | S | S | L | S | S | S | L | M |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M4UZOP04** | **PRACTICAL: DEVELOPMENTAL BIOLOGY** | **DSC PRACTICAL - IV** | **IV** | **3** | **-** | **-** | **3** | **3** |

| **Objective** | Students will acquired basic knowledge on the embryonic development and immune techniques widely adopted | | |
|---|---|---|---|
| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
| **Major** | **Gametogenesis:**<br>Observation of gametes from gonadal tissue sections.<br>**Oogenesis**: Section through ovary of fish and Cockroach.<br>**Spermatogenesis**: Section through testis of shrimp, fish and cockroach. | K3 | 12 |
| **Minor** | **Organogenesis:**<br>T.S through heart, eye, brain of 48 and 72 hours of chick embryos. | K3 | 12 |
| **Spotters** | **Chick Embryogenesis:**<br>Observation and whole mount preparation of the chick blastoderm - 18, 24, 48, 72 and 96 hours development of Chick embryonic stage. | K3 | 12 |
| **Course Outcome** | **CO1:** Acquire knowledge on gametogenesis and various stages of fertilization and embryo development | K3 | |
| | **CO2:** Learn the various developmental stages of frog and chick embryo, organogenesis from permanent prepared slides | K3 | |
| | **CO3:** Learn the variety of interacting processes generate an organism's heterogeneous shapes, size, and structural features | K3 | |
| | **CO4:** Study the various development stages | K3 | |
| | **CO5:** Learn the stage of embryogenesis development | K3 | |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Wilt, F.H. and N.K. Wessel. 2023. Methods in Developmental Biology, Thomas Y Crowell, New York.<br>2. Slack J.M.W. 2012. Essential Developmental Biology (3rd Edition), Wily-Blackwell Publications, U.S.A.<br>3. Mari-Beffa, M. and J. Knight. 2005. Key Experiments in Practical Developmental Biology, Cambridge University Press, U.K. |
| **Reference Books** | 1. Berrill, N.J. 2023. Developmental Biology, Tata Mc-Graw Hill Publications, New Delhi.<br>2. Tyler, M.S. 2000. Developmental Biology - A Guide for Experimental Study, Sunderland, MA.<br>3. Subramoniam, T. 2011. Molecular Developmental Biology (2nd Edition), Narosa Publishers, India. |
| **Website Link** | 1. https://bit.ly/4aR6xVO<br>2. https://bit.ly/3U7xhKO<br>3. https://bit.ly/3xNhsBz |

| | L-Lecture | T-Tutorial | P-Practical | C-Credit |
|---|---|---|---|---|

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M4UZOP04 | PRACTICAL: DEVELOPMENTAL BIOLOGY | | | DSC PRACTICAL-IV | IV | 3 | - | - | 3 | 3 |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | L | S | L | S | S | S | S | M | S | S |
| CO2 | M | S | S | S | S | S | S | M | S | S |
| CO3 | S | S | S | S | S | S | S | M | S | S |
| CO4 | S | S | S | S | S | S | S | M | M | S |
| CO5 | S | S | S | S | S | S | S | M | L | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Model Practical, Observation, Records |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. D. SUGANYA | Dr. D. SUGANYA | Dr. S. SHAHITHA |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOC06** | **EVOLUTIONARY BIOLOGY** | **DSC THEORY-VI** | **V** | **5** | **5** | **-** | **-** | **5** |

| | | | |
|---|---|---|---|
| **Objective** | Students will learn the principles, concepts on evolution; human evolutionary history to simulate how genetic variation within and among human populations affects risk, diagnosis, treatment of modern diseases. | | |
| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
| **I** | **Inorganic and organic evolution -** History of evolutionary thought, Primordial earth and primeval atmosphere, Chemical origin of life - Synthesis of organic molecules, Urey-Miller experiment, Origin of prokaryotes and eukaryotes. | K3 | 12 |
| **II** | **Lamarckism** - Neo Lamarckism - **Darwinism** - Neo Darwinism and modern synthetic theory - De Vrie's Mutation theory - modern concepts of mutation - Mutation and their role in evolution - Animal colouration and Mimicry. | K3 | 12 |
| **III** | **Isolating mechanisms** - Modes of speciation - Hybridization is an evolutionary catalyst - Law of Adaptive Radiation - Adaptive radiation in reptiles and mammals - Convergence and parallelism - Evolutionary constancy. | K4 | 12 |
| **IV** | **Evolutionary evidences and their significance** - Paleontological evidence - evolutionary genomics. Types of rocks - Geological time scale - Nature of fossils - Dating of fossils - Living fossils - Fossil records of man and horses. | K4 | 12 |
| **V** | Natural selection in action in man - level of selection - Eugenics, Euphenics and Euthenics - Adaptation - Human Genome Project - Evolution and ethics.<br>***Current trends:** Impact of online gaming and traces. | K4 | 12 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Annotating the Primordial earth and theories on origin of life | K3 | |
| | **CO2:** Integrate and assess Lamarckism - Neo Lamarckism - Darwinism | K3 | |
| | **CO3:** Analyze various fossil records of man and fossil records of horse, various types of rocks - Geological time scale. | K4 | |
| | **CO4:** Explain the Nature of fossils- Dating of fossils, evidence of evolution, Adaptive radiation in reptiles and mammals. | K4 | |

| | | | | |
|---|---|---|---|---|
| | **CO5:** Construct and compile the role of Human Genome Project, Evolution in the diagnosis, and treatment of diseases. | | K4 | |
| **Learning Resources** | | | | |
| **Text Books** | 1. Lull, R.S. (2010). Organic evolution, The Macmillan, New York.<br>2. Colbert, E.H. Morales, M. and Minkoff, E.C. (2011). Colbert's Evolution of The Vertebrates: A History of the Backboned Animals through time, Wiley, India.<br>3. Kishore R. Pawar, Ashok E. Desai. (2019). A textbook of Organic Evolution, Nirali Prakashan. | | | |
| **Reference Books** | 1. Rastogi VB. (1991). A Textbook of Genetics. Kedar Nath and Ram Nath Publications, Meerut, Uttar Pradesh, India.<br>2. Harth and Jones EW. (1998). Genetics: Principles and Analysis. Jones and BarHett Publisher, Boston. | | | |
| **Website Link** | 1. https://bit.ly/3nPD09m<br>2. https://bit.ly/3CHOdgL<br>3. https://bit.ly/2XvcCXl<br>4. https://bitly/3Ut1hlN | | | |
| **Self-study material** | 1. https://bit.ly/3VhpeNl | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

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|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M5UZOC06 | EVOLUTIONARY BIOLOGY | | | DSC THEORY-VI | V | 5 | 5 | - | - | 5 |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | M | S | S | S | S | M | S |
| CO2 | L | S | M | S | S | M | S | S | S | M |
| CO3 | M | S | S | M | S | S | S | S | M | S |
| CO4 | S | S | M | S | S | S | M | M | S | M |
| CO5 | S | S | M | M | S | S | S | L | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOC07** | **ANIMAL PHYSIOLOGY** | **DSC THEORY - VII** | **V** | **5** | **3** | **2** | **-** | **4** |
| **Objective** | Students will learn the insights molecular and cellular basis of physiological functions in animals and give an idea about the regulation of organ system functions. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Nutrition and respiration**<br>**Nutrition** - Digestion and absorption of carbohydrates, proteins and lipids. Minerals, vitamins and their deficiency. Hormonal control of digestion.<br>**Respiration**- Types of respiration, respiratory pigments - structure of haemoglobin, transportation of gases - Bohr effect - Regulation of respiration - bronchitis, asthma – Physiological effects of smoking | K3 | 12 |
| II | **Circulation and excretion**<br>**Circulation** - Blood - composition and functions, mechanism of clotting. Types of hearts - Heartbeat and its regulation - pace maker - Cardiac cycle - ECG - Pulse and blood pressure.<br>**Excretion** - Nephron structure and mechanism of urine formation, Regulation of acid base balance, Excretory products, Osmoregulation in fishes. | K4 | 12 |
| III | **Muscle and nerve physiology**<br>**Muscle physiology** - Types of muscles - Ultrastructure of striated muscle, muscle contraction and properties,<br>**Nerve physiology** - Neurons - structure and types Impulse propagation, synaptic transmission, neurotransmitters - Reflex action, nerve disorders - Epilepsy, Alzheimer's disease, Parkinson's disease. | K4 | 12 |
| IV | **Sense organs**<br>Structure of eye, physiology of vision, visual elements and pigments, photochemistry of vision - Eye defects - myopia, hyperopia, presbyopia, astigmatism, cataract - Structure of ear and mechanism of hearing - Hearing impairments - deafness, labyrinthine disease - Olfactory, gustatory and tactile sense organs. | K4 | 12 |
| V | **Reproductive Physiology:** Endocrine glands in man - Hormones, action and disorders - Feedback mechanism, Outlines of mechanism of hormonal activity. Puberty, adolescence, pregnancy, parturition, lactation and birth control.<br>***Current topic :** Animal sonar (Bat) | K4 | 12 |
| | ***Self-study** | | |
| **Course** | **CO1:** Explain how the various organ systems are coordinated and controlled | K3 | |

| | | | | | |
|---|---|---|---|---|---|
| **Outcome** | **CO2:** Integrating the functions of various organs in relation to physiological process. | | | K4 | |
| | **CO3:** Develop the idea of multi level controlling and feedback mechanism in relation to various physiological functions. | | | K4 | |
| | **CO4:** Apprising the basic physiological process related to adaptation, metabolism and major requirements. | | | K4 | |
| | **CO5:** Correlate and understand human physiology. | | | K4 | |
| **Learning Resources** | | | | | |
| **Text Books** | 1. Khanna, P and Kumar, P. (2021). Animal Physiology and Biochemistry, S.Chand and Co. Ltd., Publishers, New Delhi.<br>2. Goyal, K.A. and Sastry, K.V. (2017). Animal Physiology. Rastogi Publications Meerut, India. | | | | |
| **Reference Books** | 1. Guyton, A.C. and Hall, J.B. (2011). Textbook of Medical Physiology. 9th edition. W.B. Sanders Company, Prism Books (Pvt.) Ltd., Bangalore.<br>2. Hill, W.R., Wyse, G.A and Anderson, M. (2016). Animal Physiology. 4th edition. Sinauer Associates is an imprint of Oxford University Press, USA. | | | | |
| **Website Link** | 1. https://bit.ly/4aNJMlp<br>2. https://bit.ly/3TxtGi7 | | | | |
| **Self-study material** | 1. https://bit.ly/3QcDgwx | | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit | |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOC07** | **ANIMAL PHYSIOLOGY** | | | **DSC THEORY - VII** | **V** | **5** | **3** | **2** | **-** | **4** |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | L | S | S | S | S | S | S | S | M | M |
| CO2 | S | S | S | S | S | S | S | S | M | S |
| CO3 | S | S | S | S | S | S | S | S | M | S |
| CO4 | S | S | M | S | S | S | S | M | S | S |
| CO5 | S | S | M | M | S | S | S | L | M | S |
| Level of Correlation between CO and PO | L-LOW | | | | | M-MEDIUM | | | S-STRONG | |

| | |
|---|---|
| **Tutorial Schedule** | Group Discussion, Quiz program, Model preparation and Kahoot app |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. SUGANYA** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOC08** | **ENVIRONMENTAL BIOLOGY** | **DSC THEORY-VIII** | **V** | **5** | **3** | **2** | **-** | **4** |
| **Objective** | Students will understand the structure, functions of the ecosystem; awareness about the impact of socioeconomic development on the environment and the solutions put forward by the government to reduce environmental damage. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Ecosystem**<br>Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers, and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs, and ecological pyramids - Introduction, types, characteristic features, structure and function of the following ecosystem - Forest ecosystem - Grassland ecosystem - Desert ecosystem – Fresh and marine water ecosystems. | K3 | 12 |
| II | **Population Genetics and biological cycles**<br>Structure and distribution - Growth curves - Groups, Natality, Mortality - Density indices, Life study tables - factors affecting population growth - Carrying capacity. Population regulation and human population control. Complete and incomplete biogeochemical cycles – Gaseous and sedimentary cycle. | K3 | 12 |
| III | **Environmental stresses and management**<br>Global climatic change - Trend and implications. Up-taking, biotransformation, elimination and accumulation of toxicants. Factors influencing bioaccumulation from food and trophic transfer. Pesticides and other chemicals in agriculture, industry and hygiene and their disposal. Bioindicator and biomarkers of environmental health. Biodegradation and bioremediation of chemicals. | K4 | 12 |
| IV | **Environmental Pollution:** Definition - cause, effects and control measures of Air pollution - Water pollution - Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Radioactive pollution. | K4 | 12 |
| V | **Biodiversity conservation**<br>**Biodiversity crisis** - Habitat degradation, poaching of wildlife - Socioeconomic causes and loss of biodiversity - *In situ* and *ex situ* conservation of biodiversity - Hotspots of biodiversity - Green peace movement - Chipko movement - Role of government agencies - central and state pollution control boards - Ministry of Environment and Forests - National Biodiversity Authority. Awareness programme, NGOs, Natural disaster management, Legislations for environmental protection, Bio-villages - sustainable utilization and development - Environmental ethics.<br>***Current trends:** Green energy | K5 | 12 |
| | ***Self-study** | | |

| | | | |
|---|---|---|---|
| **Course Outcome** | **CO1:** Paraphrasing the fundamental structure and functions of the ecosystem. | K3 | |
| | **CO2:** Assess the inter-relationship between organisms and between biotic and abiotic factors in an ecosystem. | K3 | |
| | **CO3:** Analyze the factors that cause pollution, climate change, loss of biodiversity and depletion of resources | K4 | |
| | **CO4:** Evaluate the impact of human population growth and socio-economic development on the structure and function of the ecosystem. | K4 | |
| | **CO5:** Posting the plans to scientifically solve environmental problems using biological tools, technologies and government policies. | K5 | |

## Learning Resources

| | |
|---|---|
| **Text Books** | 1. Abdul ahad, M. and Anas Ferdous, A.S.M. 2019. A Textbook of Ecology. Himachal Publication, Bishal Book Complex, Banglabazar, Dhaka.<br>2. Eugene Pleasants Odum, Gary W. Barret (2005) Fundamentals of Ecology. Thomson Brooks/Cole.<br>3. Matthew R. Fisher. (2017). Environmental Biology. Revised edition. Open Oregon Educational Resources Publisher. |
| **Reference Books** | 1. Curtis Carson (2022) Introduction to Ecology, Callisto Reference Publication.<br>2. Jeffery Clarke (2019) Ecology, Biodiversity and Conservation, Syrawood Publishing House. |
| **Website Link** | 1. https://bit.ly/3tUs8In<br>2. https://bit.ly/2XKu7mT<br>3. https://bit.ly/3hNS1EP<br>4. https://bit.ly/2ZgrLga<br>5. https://bit.ly/3hTBO1b |
| **Self-study material** | 1. https://bit.ly/4aAdlX5 |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M5UZOC08 | ENVIRONMENTAL BIOLOGY | | | DSC THEORY-VIII | V | 5 | 3 | 2 | - | 4 |

**CO-PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | S | S | S | L | S | S | M |
| CO2 | M | M | S | M | M | S | M | S | S | S |
| CO3 | S | M | S | S | L | M | M | S | S | S |
| CO4 | S | M | S | S | S | S | M | S | M | L |
| CO5 | M | L | S | S | S | S | M | S | S | s |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | Group Discussion, Quiz program, Model preparation |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOP05** | **PRACTICAL: ENVIRONMENTAL TOXICOLOGY AND PHYSIOLOGY** | **DSC PRACTICAL - V** | **V** | **3** | **-** | **-** | **3** | **3** |
| **Objective** | Students will demonstrate and understanding the core environment toxicological principles, and define scientific principles and concepts as related to environmental studies. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| **Major** | **Estimation of Abiotic Factors:** Estimation of dissolved Oxygen, Dissolved carbon-di-oxide, Determination of salinity of water samples. Estimation of Ammonia and Nitrites. | K3 | 6 |
| **Major** | **Digestive Enzymes:** Survey of digestive enzymes in Cockroach, Ptyalin activity in relation to temperature and pH in human saliva.<br>**Biochemical Tests:** Use of pH meter for estimation of pH in water and soil samples. Collection, isolation, identification and mounting of freshwater plankton. Study of sandy shore fauna - Study of rocky shore fauna. | K4 | 6 |
| **Minor** | **Toxicity Testing**: Methodology of toxicity testing - acute and chronic tests (demonstration), Use of LC50 values - sub lethal effects of critical pollutants on fish | K4 | 6 |
| **Minor** | **Qualitative Detection of Biomolecules:** Qualitative tests for identification of carbohydrates, proteins and lipids. Estimation of Haemoglobin by Cyanmethemoglobin method, Blood grouping - total and differential counts. Determination of plasma hemoglobin, Total erythrocyte count by hemocytometer. | K4 | 6 |
| **Spotters** | Reflux condenser, BOD incubator, Spectrophotometer, Colorimeter, Atomic absorption spectroscopy, Ultracentrifuge, Incubator, HPLC.<br>Field Work: Visit to a local area to document environmental assets: river / forest / grassland / hill / mountain.<br>Visit to a local polluted site - Urban / Rural / Industrial / Agricultural.<br>Visit wastewater and drinking water treatment plants.<br>Study of a vermicompost plant. Bio gas production. | K5 | 6 |
| **Course Outcome** | **CO1:** Recall the basic equipment used in physiology and environmental toxicology lab. | K3 | |
| | **CO2:** Demonstrate the instruments, discuss the clinical importance and its applications. | K4 | |

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|---|---|---|---|
| | **CO3:** Understand and identify the toxic, chemical composition of major and minor nutrients. | K4 | |
| | **CO4**: Evaluate and Examine the various parameters of haematology and biochemistry and Identify the nitrogenous waste products of animals. | K4 | |
| | **CO5:** Grading the effect of various physical and chemical factors on enzyme activity. | K5 | |

| **Learning Resources** | | | | | |
|---|---|---|---|---|---|
| **Text Books** | 1. Widmaier, E.P., Raff, H. and Strang, K.T. (2008). Vander's Human Physiology, XI Edition., McGraw Hill Publisher.<br>2. Bishop, M.L.,Fody, E.P., Schoeff, L.E. (2010). Clinical Chemistry: Principles, Procedure, correlations. Wolters Kluwer, Inida. | | | | |
| **Reference Books** | 1. Hoar, W.S. (1983). General and Comparative Physiology. Prentice Hall of India, New Delhi.<br>2. Prosser C.L. (1985). Comparative Animal Physiology, Satish Book Enterprise, Agra.<br>3. Wood, D.W. (1968). Principles of Animal Physiology, Edward Arnold Ltd, London. | | | | |
| **Website Link** | 1. https://bit.ly/3hNyeFN<br>2. https://bit.ly/4aQP0gc<br>3. https://bit.ly/3U06Ean | | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit | |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOP05** | **PRACTICAL: ENVIRONMENTAL TOXICOLOGY AND PHYSIOLOGY** | | | **DSC PRACTICAL-V** | **V** | **3** | **-** | **-** | **3** | **3** |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | M | M | S | L | S | S | S |
| CO2 | M | S | S | S | M | S | S | S | S | S |
| CO3 | S | S | S | S | M | S | S | S | M | S |
| CO4 | S | M | S | S | S | M | M | S | M | S |
| CO5 | S | M | S | S | S | M | S | S | M | M |

| Level of Correlation between CO and PO | L-LOW-N | M-MEDIUM-2 | S-STRONG-3 |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | - |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOC09** | **ANIMAL BIOTECHNOLOGY** | **DSC THEORY - IX** | **VI** | **6** | **4** | **2** | **-** | **5** |
| **Objective** | Students will gain the knowledge of students about animal bio-techniques and their industrial application. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Fundamentals of Biotechnology:**<br>**Animal cell culture** - Basic requirements and techniques of cell culture, natural and synthetic culture media, primary culture and cell lines.<br>**Stem cells** - Types, culture and applications.<br>**r-DNA technology** - Enzymes.<br>**Vectors** - pBR322, Phage lambda, Cosmid, HAC, BAC, YAC; Host cells –<br>**Gene cloning** - Steps in cloning, selection of clones - chromogenic substrate, antibiotics. | K3 | 14 |
| II | **Techniques in Animal Biotechnology:**<br>**Isolation and purification** - DNA and mRNA.<br>**Blotting techniques** - Methods of different types of blotting.<br>**DNA sequencing** - Sanger method, DNA chips, microarray.<br>**PCR** - Principle, types and application.<br>**Gene library** - Screening with probes - Site directed mutagenesis - principle and application –<br>**Gene transfer in animal cells** - Transfection, liposomal, viral mediated, electroporation, biolistic, direct DNA injection. | K4 | 16 |
| III | **Transgenic Animal Technology:**<br>Transgenesis - Concept, transgenes, transgenic animal models - knockout mice, sheep - Applications of transgenesis - Molecular farming, Transgenic fishes, transgenic live stocks, and animals as bioreactors. | K6 | 12 |
| IV | **Animal Biotech and Health Care:**<br>Medical biotechnology - Monoclonal antibodies.<br>Recombinant vaccines - hepatitis B, hormones - insulin.<br>DNA diagnostic systems - tuberculosis, AIDS.<br>Genetic diseases – Gene therapy - Ex vivo and in vivo, role in cancer treatment - CRISPR gene editing.<br>Molecular markers - RFLP, RAPD, DNA fingerprinting and application. | K3 | 16 |

| | | | |
|---|---|---|---|
| V | **Applications and Ethics:**<br>Human genome project - Mapping of human genome, applications, ethics.<br>Industrial biotechnology – Bioreactors.<br>Basic concepts of fermentation, bioreactor design, production of ethanol and streptomycin.<br>Ethics - Socio-ethical problem, recent trends in animal biotechnology, ethical implications.<br>***Current trends**: Green Nanotechnology | K3 | 14 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Demonstrate the cell culture techniques and their requirements. | K3 | |
| | **CO2:** Differentiate the various types of molecular techniques. | K4 | |
| | **CO3:** Facilitating the transgenic techniques to produce the different animal models. | K6 | |
| | **CO4:** Examining the novel animal vaccine to prevent the various diseases. | K3 | |
| | **CO5:** Execute the animal ethics and their industrial application | K3 | |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Dubey, R.C. (2014). A textbook of Biotechnology, S. Chand and Co. Ltd., Ram Nagar, New Delhi.<br>2. Singh B. D., (2015). Biotechnology: Expanding horizon. Kalyani publishers, Chennai.<br>3. Ashish S. Verma, Anchal Singh. (2020). Animal Biotechnology: Models in Discovery and Translation. 2nd edition. Elsevier Inc. |
| **Reference Books** | 1. Sasidhara, R. (2015). Animal Biotechnology. First edition. MJP Publishers, Chennai, Tamil Nadu.<br>2. Rastogi, V.B. (2016). Principles of Molecular Biology. Medtech, Maine Publishers, USA.<br>3. Ramadass, P. (2019). Animal Biotechnology: Recent Concepts and Developments. MJP Publisher, Chennai.<br>4. Ranga, M.M. (1899). Animal Biotechanology. Third Revised Edition. CBS Publishers and Distributors Pvt. Ltd., 204 F.I.E Patparganj Industrial Area New Delhi.<br>5. Satyanarayan, U. and Chakrapani, U. (2019). Biotechnology. Publisher: Books & Allied Ltd., Kolkatta. |
| **Website Link** | 1. https://bit.ly/4b3urNT<br>2. http://bit.ly/49FvXEM |
| **Self-study material** | 1. https://bit.ly/4axvwMZ |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | | Sem. | Hours | L | T | P | C |
| 23M6UZOC09 | ANIMAL BIOTECHNOLOGY | | | DSC THEORY - IX | | VI | 6 | 4 | 2 | - | 5 |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | S | M | S | S | M | S | S |
| CO2 | L | S | M | L | s | S | M | S | M | S |
| CO3 | S | L | S | S | S | M | L | S | S | S |
| CO4 | S | S | S | S | S | S | S | M | S | S |
| CO5 | L | S | S | S | S | S | S | S | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | Group Discussion, Quiz program, Model preparation and Kahoot app, |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. D. AMERASAN | Dr. D. SUGANYA | Dr. S. SHAHITHA |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOC10** | **MICROBIOLOGY** | **DSC THEORY - X** | **VI** | **6** | **4** | **2** | **-** | **5** |
| **Objective** | Students will understand the foundational concepts of history of microbiology, microscopy, staining concepts, implement disposal and safety measures. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Introduction to microbiology:**<br>History, scope, branches of microbiology - Contribution of Leeuwanhoek, Jenner, Pasteur, Koch, and Fleming.<br>Evolution of Microbial diversity - Systematic position: Five kingdom classification of Whittaker.<br>Comparison of Bacteria, Archaea, Eukarya (tabular and diagrammatic). | K4 | 16 |
| II | **Microscopy:** Principles, functions and uses of following microscopes - Compound microscope (Monocular and Binocular microscopes) - Dark field, Phase contrast and Fluorescence microscopes, Confocal microscopes, Atomic Force Microscope .<br>Electron microscopy - TEM and SEM - principle, construction, ray diagram and uses. | K4 | 14 |
| III | **Introductory Mycology:**<br>General characteristics and outline classification of fungi.<br>Morphology of some common fungi - Mucor, Rhizopus, Aspergillus, Penicillium and Fusarium .<br>**Yeasts** - General characteristics and outline classification of yeasts - General characteristics of Lichens and Mycorrhiza. | K3 | 12 |
| IV | **Introductory Bacteriology**<br>General characteristics and Classification of Bacteria. Anoxygenic photosynthetic bacteria - Purple bacteria, Green bacteria; Oxygenic photosynthetic bacteria - Physiology and ecology. Magnetotactic bacteria - Magnetosomes, Enrichment and isolation. Staining and its type. | K3 | 16 |
| V | **Introductory Virology:** Virus Structure and Classification - Virus Entry and Viral Pathogenesis - Positive strand RNA viruses - Picornaviruses, Coronaviruses; Negative strand and double strand RNA viruses - Orthomyxoviruses and Reoviruses; DNA viruses - Adenoviruses and Baculoviruses.<br>***Current trends:** Coronavirus genome structure and replication | K4 | 14 |
| | ***Self-study** | | |

| | | | |
|---|---|---|---|
| **Course Outcome** | **CO1:** Categorize the history, relevance of microbiology and classification of bacteria | K4 | |
| | **CO2:** Analyze the working of various microscopes and their application | K4 | |
| | **CO3:** Gain knowledge of various (physical and chemical) methods of control of microorganisms and safety measures to be followed while handling microbes | K3 | |
| | **CO4:** Identify the structure of bacterial cells, its organelles, physiology and behaviour. | K3 | |
| | **CO5:** Organizing the different methods of staining bacteria and demonstrate proficiency in handling aseptic bacteriological specimens. | K4 | |

| **Learning Resources** | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Aneja K.R. (2022). Experiments in Microbiology, plant pathology, Tissue culture and Mushroom Cultivation. Sixth edition. New Age International Publishers, New Delhi.<br>2. Parker, N. (2024). Microbiology. ASM Press, Houston, Texas. | | | |
| **Reference Books** | 1.Pelczar, M.J., Chan, E.C.S. and Krieg, N.R. (2023). Microbiology. 24th edition. Assorted Editorial, Mumbai.<br>2.Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (2007). Introductory Mycology. Fourth edition. Wiley Publishers, Hoboken, New Jersey, U.S.<br>3. Reddy, R. and Reddy, S.M. Essentials of Virology. (2007). Second edition. Scientific Publishers Journals Department, Rajasthan, India. | | | |
| **Website Link** | 1.https://bit.ly/441gFZu<br>2.https://bit.ly/43UMgMJ<br>3.https://bit.ly/3U1pj5V<br>4.https://bit.ly/3JjLAqE<br>5.https://bit.ly/4cUbDlM | | | |
| **Self-study material** | 1. https://bit.ly/3xIIVnH | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | Course Type | Sem. | Hours | L | T | P | C | |
| 23M6UZOC10 | MICROBIOLOGY | DSC THEORY - X | VI | 6 | 4 | 2 | - | 5 | |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | L | S | M | S | S | M |
| CO2 | S | S | S | S | S | S | S | S | S | S |
| CO3 | M | S | S | M | S | S | S | S | S | S |
| CO4 | S | S | M | S | S | M | S | M | S | S |
| CO5 | S | S | S | S | S | S | S | L | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | Group Discussion, Quiz program, Model preparation and Kahoot app, |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOC11** | **IMMUNOLOGY** | **DSC THEORY - XI** | **VI** | **6** | **3** | **3** | **-** | **4** |
| **Objective** | Students gain knowledge about on immune systems and immunological disorders | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Immune Cells and Organs:**<br>General concepts of Immune System.<br>Cells of the immune system - T and B lymphocytes, NK cells; Monocytes and macrophages; Neutrophils, eosinophils, and basophils - Mast cells and dendritic cells.<br>Organs of the immune system - Primary lymphoid organs - Thymus and bone marrow; Secondary Lymphoid organs - Lymph nodes and spleen; Lymphatic tissues. | K3 | 16 |
| II | **Innate and Adaptive Immunity:**<br>Innate and Adaptive Immunity; Anatomical barriers, Inflammatory response, Cells and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).<br>Receptors and Signaling - Cytokines and Chemokines - General Properties of Cytokines and Chemokines.<br>Major Histocompatibility Complex (MHC) - Organization and inheritance of the MHC. Structure and cellular distribution of HLA antigens. | K3 | 14 |
| III | **Antigen and Antibodies:**<br>Antigens - Antigenicity and immunogenicity - Properties - foreignness, molecular size, heterogeneity. B and T epitopes, T-dependent and T-independent B cell responses.<br>Antibodies - Structure, function and properties of the Immunoglobulins, Different classes of Immunoglobulins.<br>Hybridoma technology - production of monoclonal antibodies. | K4 | 12 |
| IV | **Hypersensitivity and Autoimmune Diseases:**<br>Hypersensitivity - classification and brief description of various types of hypersensitivities.<br>Autoimmunity - cause of autoimmune diseases - classification of autoimmune diseases.<br>Transplantation immunology - Types of grafts, immunologic basis of graft rejection, immunosuppressive therapy and clinical transplantation. | K5 | 16 |

| | | | |
|---|---|---|---|
| **V** | **Clinical Immunology:** Immunity and tumors - tumor antigens (TSTA and TAA), immune response to tumors. Tumor evasion of the immune system, Immunotherapy for tumors. Immunity against - viral, bacterial and parasitic infections.<br>Vaccines - Types and uses - Immunization schedule for children.<br>***Current trends:** The Regulation of Human Trophoblast Apoptosis and Survival during Pregnancy. | K5 | 14 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Sketching the basic structure and function of immunological organs. | K3 | |
| | **CO2:** Classify the different types of immunity and their responses. | K3 | |
| | **CO3:** Analyze the biological characteristics of the antibodies and their production. | K4 | |
| | **CO4:** Evaluate the mechanism of hypersensitivity reactions and autoimmune diseases. | K5 | |
| | **CO5:** Rating the immune responses against pathogens. | K5 | |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Fatima, D., Narayanan, M., Mani, A., Selvaraj, A.M. and Arumugam, N. (2022). Immunology. Saras Publication, Nagercoil, Kanyakumari, Tamil Nadu.<br>2. Ghosh, S. (2021). Immunology and Immunotechnology. Books and Allied Publishers, Kolkata, West Bengal.<br>3. Rao, C.V. (2011). Immunology. Narosa Publishing House, New Delhi. |
| **Reference Books** | 1. Abul A. Andrew, Lichtman. H, Shiv. P, (2023). Cellular and Molecular Immunology, 8th edition, W.B. Saunders Publisher.<br>2. Rajasekara Pandian, M. (2007). Immunology and Immunotechnology. Panima Publisher, Delhi.<br>3. Ananthanarayan, R. and Jayaram Paniker, C.K. (2020). Ananthanarayan and Paniker's Textbook of Microbiology, Eleventh Edition. |
| **Website Link** | 1. https://www.immunology.org/<br>2. https://microbenotes.com/category/immunology/ |
| **Self-study material** | 1. https://bit.ly/3xUb5w1 |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOC11** | **IMMUNOLOGY** | | | **DSC THEORY - XI** | **VI** | **6** | **3** | **3** | **-** | **4** |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | M | S | S | S | S | M | S | S |
| CO2 | L | L | S | S | S | S | S | S | S | S |
| CO3 | S | S | S | S | S | M | M | S | S | S |
| CO4 | S | S | S | S | S | S | S | S | S | M |
| CO5 | S | M | S | S | M | S | S | M | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | Group Discussion, Quiz program, Model preparation and Kahoot app, |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. AMERASAN** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOP06** | **PRACTICAL: BIOTECHNOLOGY** | **DSC PRACTICAL - VI** | **VI** | **3** | **3** | **-** | **-** | **3** |

| **Objective** | Students will interpret the organization of genomic material and to research theories of genetic inheritance, molecular and genetic experiments in an accurate and meaningful manner. | | |
|---|---|---|---|
| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
| **Major** | **Isolation of genetic molecules**: Isolation of DNA from spleen. Total RNA isolation from plant/animal cells.<br>**Molecular analysis:** Agarose gel electrophoresis of DNA. Restriction fragment length polymorphism study. Eliza, Western Blot.<br>**Basic animal cell culture technique and transgenesis**: Trypsinization of liver cells - Determination of the viability of trypsinized cells by Trypan Blue method. | K3 | 12 |
| **Minor** | **Qualitative and quantitative analysis of genetic molecules:** Determination of the purity of isolated DNA and RNA samples by UV spectrophotometry - Quantitative estimation of DNA by spectrophotometry<br>**Blood Grouping**: Total WBC and RBC - Estimation of Haemoglobin -Preparation of Serum components - Radial Immunodiffusion test - Double Immunodiffusion test. | K4 | 12 |
| **Spotters** | Ethidium Bromide, Polymerase Chain Reaction (PCR), Agarose, Enzyme-Linked Immunosorbent Assay, Spectrophotometer, Electrophoresis, Trysinization, Trypan Blue, Immunoglobulin, Structure of IgM, IgA, IgG and Restriction Fragment Length Polymorphism (RFLP). | K5 | 12 |
| **Course Outcome** | **CO1:** Interpret the organization of genomic material and to research theories of genetic inheritance. | K2 | |
| | **CO2:** Preparing the sample of genetic molecules and to determine their purity, structure and characteristics. | K3 | |
| | **CO3:** Experiment with genomic preparations and devise techniques to distinguish genetic material in different organisms to survey biodiversity. | K3 | |
| | **CO4:** Assess the changes in genetic material and to predict and consider the consequences of those changes. | K4 | |
| | **CO5:** Report and justify the results of molecular and genetic experiments in an accurate and meaningful manner. | K5 | |
| **Learning Resources** | | | |
| **Text Books** | 1. Meena, S.N. and Naik, M. (2019). Advances in Biological Science Research: A Practical Approach, Academic Press, New York, USA.<br>2. Perlin, M., Beckerson,W. and Gopinath, A. (2017) Cell, Genetics, and | | |

| | |
|---|---|
| | Molecular Biology: A Lab Manual (First Edition), Cognella Inc., USA.<br>3. Saxena, J., Baunthiyal, M. and Ravi, I. (2015) Laboratory Manual of Microbiology, Biochemistry and Molecular Biology, Scientific Publishers, India. |
| **Reference Books** | 1. Hofmann, A. and Clokie, S. (2018). Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology, Cambridge University Press, UK.<br>2. Stauffer, S., Gardner, A., Wilko Duprez, Ungu, D.A.K. and Wismer, P. (2018). Labster Virtual Lab Experiments: Basic Genetics, Springer Publishers, NY, USA. |
| **Website Link** | 1. https://bit.ly/49B4hAD<br>2. https://bit.ly/3xJ25tz<br>3. https://bit.ly/3JkSplk<br>4. https://bit.ly/3Jj5Zfj<br>5. https://bit.ly/3Ufmvn4 |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOP06** | **PRACTICAL: BIOTECHNOLOGY** | | | | **DSC PRACTICAL - VI** | **VI** | **3** | **-** | **-** | **3** | **3** |

**CO-PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S |
| CO2 | S | S | M | S | S | S | S | M | S | S |
| CO3 | M | M | S | S | M | S | M | L | L | S |
| CO4 | S | S | S | S | S | S | S | M | S | S |
| CO5 | M | S | S | S | S | S | S | S | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | - |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. M. PRABU** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

B.Sc., ZOOLOGY abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards
Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

| S. No. | SEM | COURSE_CODE | TITLE OF THE COURSE |
|---|---|---|---|
| 1 | I | 23M1UZOFC1 | ECONOMIC ZOOLOGY |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOFC1** | **ECONOMIC ZOOLOGY** | **FC THEORY-I** | **I** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Students will understand the concept of breeding, cross breeding and the importance of high yield varieties and its marketing strategies. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Economic Entomology: Apiculture:** Species of honey bees – Social organisation of honey bee – selection of bees and location for apiary – Newton"s bee hive – products of bee keeping – enemies and diseases of honey bees. **Sericulture:** Species of silkworm – life history of mulberry silkworm – Rearing of silkworm – pests and diseases of silkworm. **Lac Culture:** Introduction – Life history – Host plants – cultivation of Lac – Enemies of lac cultivation – Economic importance of Lac. | K5 | 5 |
| II | **Vermiculture:** Introduction: Types of earthworms – ecological classifications of earthworms – Physical, chemical and biological changes caused by earthworms in the soil – Natural enemies of earthworms. Vermicomposting: vermicomposting methods – factors affecting vermicomposting – Vemiculture unit. Harvesting of vermicompost – vermicast – advantages of vermicompost – vermiwash and its applications | K4 | 5 |
| III | **Aquaculture**: Fresh water aquaculture: Carp culture – types of ponds – preparation – maintenance – harvesting and management. Integrated and composite culture. Prawn culture. Marine Aquaculture: Edible – pearl oyster culture. Ornamental fish culture: Aquarium fishes – Aquarium maintenance in home | K4 | 4 |
| IV | **Poultry Farming:** Poultry industry in India – Poultry for sustainable food production and livelihood - Commercial poultry farming – Nutritive value of egg and meat- Broiler management (Definition; Housing and equipment; Brooding, feeding and health cover of broilers; Record keeping; Broiler integration) – Layer management (Brooder; Grower and layer management; Culling of layers; Marketing of eggs and meat). Women in backyard poultry farming. | K4 | 5 |
| V | **Dairy Farming:** Dairy farming – advantages of dairying – classification of breeds of cattle – Indigenous and exotic breeds – Selection of dairy cattle. Breeding – | K6 | 5 |

| | | | |
|---|---|---|---|
| | artificial insemination – Dairy cattle management – housing – water supply – cattle nutrition feeding standards – Common contagious diseases. Milk - Composition of milk – milk spoilage pasteurization – Role of milk and milk products in human nutrition – Dairying as a source of additional income and employment. | | |
| **Course Outcome** | **CO1:** Create the awareness about on economically importance breeds and varieties of poultry, fish, bees, and cattle and understand the basic aspects of farming. | K5 | |
| | **CO2:** Assess and integrate the available tools and techniques to increase the productivity in farms | K4 | |
| | **CO3:** Analyze, compare and distinguish the different methods of farming and marketing strategies of products. | K4 | |
| | **CO4:** Correlate the use of available resources in improving the breeds, vermicomposting, farm products etc. | K4 | |
| | **CO5:** Design new methods to improve farm animals with increased productivity and disease resistance and to construct new methods in vermicomposting. | K6 | |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Sastry, N.S.R., C.K.Thomas and R.A.Singh, 2015. Livestock Production Management, 4 thEd.Kalyani Publishers, New Delhi.<br>2. ICAR, 2013. Hand book of Animal Husbandry, 4th Ed., ICAR Publication, Pusa, New Delhi |
| **Reference Books** | 1. Glenn Munroe (2011) Manual of on-Farm vermicomposting and vermiculture, Holdanca Farms Ltd, Wallace, Nova Scotia.<br>2. Hanifa, M.A., 2011. Aquatic resources and aquaculture, Dominent, New Delhi. |
| **Website Link** | 1. https://bit.ly/3tXHjk8<br>2. https://bit.ly/3tUTHBu<br>1. 3. https://bit.ly/3hVv96q |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOFC1** | **ECONOMIC ZOOLOGY** | | | **FC THEORY-I** | **I** | **2** | **2** | **-** | **-** | **2** |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | P03 | P04 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | S | S | M | L | S | S | S | L | M |
| CO2 | M | M | M | L | M | S | M | M | L | S |
| CO3 | S | M | S | L | M | S | S | S | M | M |
| CO4 | S | S | S | M | L | S | S | S | S | S |
| CO5 | M | L | M | M | M | M | S | M | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
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B.Sc., ZOOLOGY abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards
Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

| S.No. | SEM | COURSE_CODE | TITLE OF THE COURSE |
|---|---|---|---|
| 1 | V | 23M5UZOE01 | AGRICULTURAL ENTOMOLOGY |
| 2 | V | 23M5UZOE02 | MEDICAL LABORATORY TECHNIQUES |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOE01** | **AGRICULTURAL ENTOMOLOGY** | **DSE THEORY-I** | **V** | **5** | **1** | **4** | **-** | **3** |
| **Objective** | Students to gain the knowledge of the students for classification of insects and their management. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Outline classification of insects:** Causes for insects assuming pest status - Methods of collection, mounting and preservation of insect pests. | K3 | 8 |
| II | **Insect vectors of plant diseases:** Insect pests of stored grains their preventive and curative methods, Most common insect pests of the following plants and their control measures - Paddy, Sugarcane, Groundnut, Coconut and Cotton. Locust and its control. Insect pollinators and scavengers. | K3 | 8 |
| III | **Apiculture:** Introduction, types of honey bees, hive, apiary, selection of bees for apiary, Newton's bee hive, enemies and diseases of honey bees. **Sericulture**: Introduction, types of silk worms, silk worm races, life history of mulberry silk worm, features of sericulture industry, pests and diseases of silkworm. **Lac Culture**. | K4 | 8 |
| IV | **Integrated pest management (IPM)**: Physical, mechanical, chemical and biological control methods, Pesticide application equipment. | K5 | 8 |
| V | **Introduction and steps towards IPM:** Pheromones, antifeedants, repellents and biopesticide.<br>***Current trends**: Insect-Plant Interactions | K4 | 8 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Differentiate the classification of insects and preservation methods. | K3 | |
| | **CO2:** Implement the insect vector control measures. | K3 | |
| | **CO3:** Analyze the economical importance of insects and their uses. | K4 | |
| | **CO4:** Design novel equipments, pesticide formulation and their application. | K5 | |
| | **CO5:** Schedule the various test methods of pest management. | K4 | |
| **Learning Resources** | | | |

| | | | | |
|---|---|---|---|---|
| **Text Books** | 1. David, A.K. (2006). General and Applied Entomology. Second edition. Tata McGraw Hill Publishing Company Ltd., New Delhi, India.<br>2. David, V. and Ramamurthy. (2012). Elements of Economic Entomology. Seventh edition. Namrutha publications, Chennai.<br>3. Rinkikumari, C.C., Naveen Kumar, M.D. and Ravi Kumar, R. (2023). Agricultural Entomology. Rubicon Publications, London, WC1A 2RP, England. | | | |
| **Reference Books** | 1. Jha, L.K. (2010). Applied Agricultural Entomology. New Central Book Agency, New Delhi.<br>2. Abishek Shukla, D. (2009). A Hand Book of Economic Entomology. Vedamse Books, New Delhi. | | | |
| **Website Link** | 1. http://www.ipm.ucdavis.edu<br>2. www.entsoc.org | | | |
| **Self-study material** | 1.https://bit.ly/3U88Flc | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOE01** | **AGRICULTURAL ENTOMOLOGY** | | | **DSE THEORY - I** | **V** | **5** | **1** | **4** | **-** | **3** |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | S | S | L | S | S | S | S |
| CO2 | L | M | S | S | S | S | M | S | M | S |
| CO3 | S | S | S | S | S | S | S | S | S | M |
| CO4 | M | S | M | S | S | M | S | M | S | S |
| CO5 | S | S | S | S | M | S | S | S | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | Group Discussion, Quiz program, Model preparation and Kahoot app, |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. AMERASAN** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M5UZOE02** | **MEDICAL LABORATORY TECHNIQUES** | **DSE THEORY - II** | **V** | **5** | **1** | **4** | **-** | **3** |
| **Objective** | Students to understand the different protocols and procedures to collect clinical samples and the safety precautions while handling clinical samples. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Laboratory Safety and Human Health and Hygiene:** Laboratory safety - toxic chemicals and biohazards waste - biosafety level- good laboratory practice - health and hygiene issue - physiological effect of alcohol, tobacco, smoking and junk food and its treatment | K3 | 12 |
| II | **Hematology:** Composition of blood and their function - collection of blood - haemopoiesis - types of anaemia - mechanism of blood coagulation - bleeding time - clotting time - determination of hemoglobin - erythrocyte sedimentations rate - packed cell volume - Total count of RBC and WBC - Differential count WBC - blood grouping and typing - haemostasis - bleeding disorder of man - Platelet count. | K3 | 12 |
| III | **Microbiology and Instrumentation Techniques:** Definition and scope of microbiology. Parasites - Entamoeba and Plasmodium - Computer tomography (CT scan) - Magnetic Resonance Imaging - treadmill test. | K4 | 12 |
| IV | **Medical Physiology:** Cardiovascular system - Blood pressure - Pulse - regulation of heart rate, cardiac shock. Heart sounds, Electrocardiogram (ECG) - significance - Ultrasonography - Electroencephalography (EEG). | K4 | 12 |
| V | **Diagnostic Pathology:** Handling and labeling of histology specimens Fixation - Tissue processing - processing of histological tissues for paraffin embedding block preparation.<br>Microtomes - Types of microtome - sectioning and staining.<br>Staining methods - Vital staining - mounting - problems encountered during section cutting and remedies.<br>***Current trends:** Robotic systems and artificial intelligence to perform routine tests - Hemostaseology. | K5 | 12 |

| | | | |
|---|---|---|---|
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Interpret the protocols and procedures of human physiological diagnosis. | K3 | |
| | **CO2:** Explain the characteristics of clinical samples. | K3 | |
| | **CO3:** Demonstrate skill in handling clinical equipment. | K4 | |
| | **CO4:**Evaluate the hematological and histological parameters of biological samples | K4 | |
| | **CO5:** Elaborate the role of medical laboratory techniques in healthcare industry. | K5 | |

## Learning Resources

| | |
|---|---|
| **Text Books** | 1. Praful B. Godkar; Darshan P. Godkar. (2011). Textbook of medical Laboratory Technology, Mumbai.<br>2. Vaz, M.D. and Raj, T. (2016). Textbook of Medical Physiology, 10th edition, Elsevier, New Delhi. |
| **Reference Books** | 1. Manoharan, A. and Sethuraman, S. (2003). Essential Clinical Heamatology. Jaypee Brothers, Medical Publishers, New Delhi.<br>2. Richard, A, McPherson, Mathew, R, Pincus, (2007). Clinical and management by laboratory methods, Elsevier, Philadelphia.Published by Tata McGraw-Hill Education Pvt. Ltd.,<br>3. Ochei, J. and Kolhatkar, A. (2000). Medical Laboratory science: Theory and practice, Published by Tata McGraw-Hill Education Pvt. Ltd., First edition.<br>4. Paniker CK Jayaram and Sougata Ghosh. (2014). Paniker's Textbook of Medical Parasitology. 7th Edition. Jaypee Brothers Medical Publishers (p) Ltd., Delhi. |
| **Website Link** | 1. https://bit.ly/3tUs8In<br>2. https://bit.ly/2XKu7mT<br>3. https://bit.ly/3hNS1EP<br>4. https://bit.ly/2ZgrLga<br>5. https://bit.ly/3hTBO1b |
| **Self-study material** | 1. https://bit.ly/3W9VouN |

| | | | | | |
|---|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit | |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | Course Type | Sem. | Hours | L | T | P | C |
| 23M5UZOE02 | MEDICAL LABORATORY TECHNIQUES | DSE THEORY-II | V | 5 | 1 | 4 | - | 3 |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | L | S | S | S | S | S | S | S | S | M |
| CO2 | M | S | S | M | M | S | S | S | S | S |
| CO3 | S | S | S | S | S | S | S | S | S | S |
| CO4 | S | S | S | S | S | S | S | S | M | M |
| CO5 | M | S | S | S | S | S | S | S | S | s |
| Level of Correlation between CO and PO | L-LOW | | | | | M-MEDIUM | | | S-STRONG | |

| | |
|---|---|
| Tutorial Schedule | Group Discussion, Quiz program, Model preparation |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. D. SUGANYA | Dr. D. SUGANYA | Dr. S. SHAHITHA |

B.Sc., ZOOLOGY abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards
Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

| S.No. | SEM | COURSE_CODE | TITLE OF THE COURSE |
|---|---|---|---|
| 1 | II | 23M2UZOS01 | BASICS OF MARINE BIOLOGY |
| 2 | III | 23M3UZOS02 | AQUARIUM KEEPING |
| 3 | III | 23M3UZOS03 | BIOCOMPOSTING FOR ENTREPRENEURSHIP |
| 4 | IV | 23M4UZOS04 | FOOD NUTRITION AND HEALTH |
| 5 | IV | 23M4UZOS05 | RADIATION BIOLOGY |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M2UZOS01** | **BASICS OF MARINE BIOLOGY** | **SEC THEORY -I** | **II** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Students will learn the physical, chemical and biological aspects of marine environment and to gain knowledge about the management of oceans. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Marine Ecology :**<br>***Marine environment*** - light, temperature, salinity, pressure;<br>***Pelagic environment*** – Planktonic and Nektonic adaptations;<br>***Benthic environment*** - intertidal, interstitial and deep sea adaptations;<br>***Important marine ecosystems*** - coral reefs, estuaries, mangroves, sea grass beds, kelp forests polar seas and hydrothermal vents. | K2 | 5 |
| II | **Physical Oceanography :**<br>***Physical Properties of Seawater***- density, viscosity, surface tension, conductivity<br>***Temperature distribution in the sea*** - heat budget, UV radiation; El Nino/La Nina, global warming, sea level rise<br>***Water movement*** – Ocean circulation, Waves, Currents and Tides, Tsunami. | K4 | 5 |
| III | **Chemical Oceanography :**<br>***Chemical composition of seawater***- ionic, major and minor constituents, major and minor elements, trace elements<br>***Chemistry of seawater constituents***- chlorinity and salinity, CO2 absorption, ocean acidification, | K4 | 4 |
| IV | **Biological Oceanography :**<br>***Plankton*** - classification based on size, mode of life and habitat. ***Phytoplankton and Zooplankton*** - methods of collection, estimation of standing crop-wet and dry weight, chlorophyll content<br>***Primary productivity*** – dissolved oxygen, biological oxygen demand, chemical oxygen demand, estimation and factors affecting primary productivity, ocean deoxygenation | K4 | 5 |
| V | **Marine Pollution and Ocean Management :**<br>***Ocean pollution*** - oil spills, sewage and industrial pollution, marine debris, nuclear waste disposal, | K6 | 5 |

| | | | |
|---|---|---|---|
| | eutrophication, algal bloom<br>***Ocean management*** - Role of National and international agencies and organizations in ocean management.<br>***Ocean policy (India)*** - research and management. | | |
| **Course Outcome** | **CO1:** Define marine ecosystem, recognize and describe the interrelationship between biology and ocean technology. | K2 | |
| | **CO2:** Articulate and classify the dynamics and the physical attributes of the ocean, interpret the factors which affect the global climate | K4 | |
| | **CO3:** Identify and analyze the physical and biological factors of marine environments, and focus life in the open sea. | K4 | |
| | **CO4:** Evaluate the impact of variations in abiotic factors in marine productivity and justify the role of human activities in the degradation of marine ecosystems. | K4 | |
| | **CO5:** Categorize marine pollutants and develop controlling measures in collaboration with the institutions for ocean management. | K6 | |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Nair, N.B. and D.M. Thampy (1980) A Text Book of Marine Ecology. The Macmillan Co. India Ltd., New Delhi, 352 pp.<br>2. Sverdrup, H.U., M.W. Johnson and R.H. Flemming (1958) The Oceans – their Physics, Chemistry and General Biology. Prentice – Hall Inc. New Jersey, 1087 pp. |
| **Reference Books** | 1. Levinton, J. S. (2009). Marine biology. Function, biodiversity, ecology. 5th Edition. Oxford Univ. Press. 592 p.<br>2. Nybakken, J. W. and Bertness, M.D. (2004). Marine biology. An ecological approach. 6th Edition. Benjamin-Cummings Pub Co. 579 pp.<br>3. McCormick, J.M. and J.V. Thiruvathakal (1976) Elements of Oceanography. 2 nd edition, W.B. Saunders, Philadelphia, 346 pp.<br>4. Harold V.Thurman (2004) Introductory Oceanography. 10th edition, Prentice Hall Inc, New Jersey, 624 pp. |
| **Website Link** | 1. https://bit.ly/3cLjOqe<br>2. https://bit.ly/3KN5ABO<br>3. https://bit.ly/3BdNgyt |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | Course Type | Sem. | Hours | L | T | P | C | |
| 23M2UZOS01 | BASICS OF MARINE BIOLOGY | SEC THEORY -I | II | 2 | 2 | - | - | 2 | |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | L | S | M | S | M | M |
| CO2 | M | L | S | L | M | S | S | M | L | S |
| CO3 | S | S | M | L | M | S | M | S | M | M |
| CO4 | S | M | S | S | L | S | S | S | S | S |
| CO5 | M | S | M | M | M | M | S | S | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
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| Dr. D. SUGANYA | Dr. D. SUGANYA | Dr. S. SHAHITHA |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOS02** | **AQUARIUM KEEPING** | **SEC THEORY-II** | **III** | **1** | **1** | **-** | **-** | **2** |
| **Objective** | Students gain the knowledge on self employment opportunities of ornamental fishes and provide the knowledge of ornamental fishes and their equipment. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | Introduction and scope - Aquarium fish keeping as a hobby and cottage industry. Commercial aspects like national and international market - Self employment opportunity. | K2 | 5 |
| II | External morphology of a typical fish. Exotic and endemic varieties of ornamental fishes. | K2 | 5 |
| III | Aquarium preparation and maintenance - Kinds of tanks, tank setting, biological filter and aeration, water management, planting, lighting and feeds. Budget for setting up an Aquarium Fish Farm as a Cottage Industry | K3 | 4 |
| IV | Live fish transport - handling, feeding and forwarding techniques of fish. Fish Diseases and their control. | K3 | 5 |
| V | Breeding - Common characters and sexual dimorphism of Freshwater and Marine aquarium ornamental fish varieties such as Guppies, Mollies, Swordtails, Platy, Siamese fighters and Goldfish, Blue morph and Bowl Fish - Anemone fish, Butterfly fish, Clown fish and Prawn.<br>**Current trends :** Aquaponics - Integrating fish and plant culture | K4 | 5 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Identify the different ornamental fishes and their diseases | K2 | |
| | **CO2:** Relating the techniques of aquarium for introduce their own shop | K2 | |
| | **CO3:** Apply the techniques in ornamental fishes | K3 | |
| | **CO4:** Acquire knowledge about aquaculture: Importance and its scope | K3 | |
| | **CO5:** Develop the entrepreneur potential in the field of aquarium and get self employment. | K4 | |
| **Learning Resources** | | | |

| | | | | |
|---|---|---|---|---|
| **Textbooks** | 1. Reddy, M. S. (2004). A Text Book of Aquaculture. First Edition. Discovery Publishing Pvt. Ltd., New Delhi.<br>2. Mouliraj, P. (2020). Text Book of Aquaculture. Notion Press Publication, Chennai, India. | | | |
| **Reference Books** | 1. Robert, R., Delbert, S. and Gatlin, M. (2022). Aquaculture: An Introductory Text, 4th Edition, Cabi Publication.<br>2. Suresh, E., Kalaiselvi, N., Shanmugam, S.A. (2024). Principles of Fish Genetics. Narendra Publication.<br>3. JingranV.G. 1991. Fish and Fisheries in India. Hindustan Publication Co., New Delhi. | | | |
| **Website Link** | 1. https://bit.ly/3Jh6ZAM<br>2. https://bit.ly/3PUk8mP | | | |
| **Self-study material** | 1. https://bit.ly/49PGHjI | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOS02** | **AQUARIUM KEEPING** | | | **SEC THEORY-II** | **III** | **1** | **1** | **-** | **-** | **2** |

**CO-PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | L | S | S | L | S | L | S |
| CO2 | L | M | S | L | S | L | L | S | S | S |
| CO3 | S | S | M | L | S | M | M | S | M | S |
| CO4 | L | L | S | M | S | L | L | S | S | S |
| CO5 | M | M | S | M | S | L | M | S | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | - |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. SUGANYA** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOS03** | **BIOCOMPOSTING FOR ENTREPRENEURSHIP** | **SEC THEORY-III** | **III** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Students acquired the knowledge on biocomposting process and entrepreneurship development. | | | | | | | |

| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
|---|---|---|---|
| **I** | **Biocomposting** - Definition, types and ecological importance. | K2 | 5 |
| **II** | **Types of Biocomposting Technology** - Field pits, ground heaps, tank, large scale, batch and continuous methods. | K3 | 4 |
| **III** | **Preparation of Biocompost:** Pit and bed method using different amendments. | K3 | 5 |
| **IV** | **Applications of Biocompost:** Soil fertility maintenance - Promotion of plant growth - Value added products - Waste reduction. | K4 | 5 |
| **V** | **Economics of establishment of a small biocompost unit:** Project report proposal for Self Help Group (Income and employment generation).<br><br>***Current trends:** Biological decomposition of plastics. | K3 | 5 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Explain the biocomposting types and their importance. | K2 | |
| | **CO2:** Implement the methods of composting techniques. | K3 | |
| | **CO3:** Apply the formulation of biocompost. | K3 | |
| | **CO4:** Evaluate the functional properties of biocompost and their application. | K4 | |
| | **CO5:** Create an employment opportunities and its significance. | K6 | |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Mary Violet Christy, M.V. (2015). Vermitechnology. MJP Publishers, Chennai, Tamil Nadu.<br>2. Ahmad, S.R. (2020). Vermicompost Production. First edition. Nitya Publications Gulmohar, Bhopal (MP), India. |

| | | | | |
|---|---|---|---|---|
| **Reference Books** | 1. Rathour, A.K. (2020). Vermitechnology: Farm and Fertilizer. Discovery Publishing House Pvt. Ltd., | | | |
| **Website Link** | 1. https://rb.gy/lbgy97<br>2. https://rb.gy/6cb0n7 | | | |
| **Self-study material** | 1. https://bit.ly/3RmixHx | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZOS03** | **BIOCOMPOSTING FOR ENTREPRENEURSHIP** | **SEC THEORY-III** | **III** | **2** | **2** | **-** | **-** | **2** |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | S | S | S | S | S | S | S | S |
| CO2 | L | S | M | S | M | M | S | S | S | M |
| CO3 | S | S | S | S | S | S | L | S | M | S |
| CO4 | S | M | S | S | S | S | S | S | S | S |
| CO5 | M | S | S | S | M | S | M | S | S | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | - |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

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| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M4UZOS04** | **FOOD NUTRITION AND HEALTH** | **SEC THEORY - IV** | **IV** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Students will learn the basic concepts of balanced diet for people of different ages; the consequences of malnutrition and the deficiency diseases; diseases caused due to poor hygiene. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Nutrition and dietary nutrients:**<br>Basic concepts of Food: Components and nutrients. Concept of balanced diet, nutrient requirements and dietary pattern for different groups viz., adults, pregnant and nursing mothers, infants, school children, adolescents and elderly people. | K3 | 5 |
| II | **Macronutrients and micronutrients:**<br>Macronutrients - Carbohydrates, Lipids, Proteins - Definition, Classification, their dietary source and role. Micronutrients. Vitamins - water soluble and fat soluble vitamins - their sources and importance. Important minerals *viz.*, Iron, Calcium, Phosphorus, Iodine, Selenium, Zinc and their biological functions. | K3 | 4 |
| III | **Malnutrition and nutrient deficiency diseases:**<br>Definition and concept of health: Common nutritional deficiency diseases - Protein Malnutrition (e.g., Kwashiorkor and Marasmus), Vitamin A deficiency, Iron deficiency and Iodine deficiency disorders - their symptoms, treatment, prevention and government initiatives. | K4 | 5 |
| IV | **Lifestyle dependent diseases:**<br>Causes and prevention of Hypertension, diabetes mellitus, and obesity. Social health problems - smoking, alcoholism and narcotics.<br>Acquired Immunodeficiency Syndrome (AIDS) - causes, treatment and prevention. | K4 | 5 |
| V | **Diseases caused by microorganisms:**<br>Food hygiene - Potable water - sources and methods of purification at domestic level. Food and Waterborne infections.<br>Bacterial diseases: Cholera and typhoid fever; Viral diseases - Hepatitis and Poliomyelitis; Protozoan diseases - Amoebiasis and giardiasis; Parasitic diseases - Taeniasis and ascariasis their transmission, causative agent, sources of infection, symptoms and prevention.<br>***Current trends**: Keto and Paleo diet | K4 | 5 |
| | ***Self-study** | | |

| | | | |
|---|---|---|---|
| **Course Outcome** | **CO1:** Inferring the role of nutrition and dietary nutrients. | K3 | |
| | **CO2**: Gain knowledge about macronutrients and micronutrients requirements of the human body. | K3 | |
| | **CO3:** Analyze malnutrition and nutrient deficiency diseases. | K4 | |
| | **CO4**: Apprising the lifestyle related diseases, hygiene, food safety, disease transmission. | K4 | |
| | **CO5:** Evaluate the diseases caused by various microorganisms. | K4 | |

| **Learning Resources** | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Lakra, P. and Singh M.D. (2008). Textbook of Nutrition and Health; First Ed; Academic Excellence.<br>2. Bamji, M.S.; Rao, N.P. and Reddy, V. (2009). Textbook of Human Nutrition; Oxford & IBH Publishing Co. Pvt Ltd. | | | |
| **Reference Books** | 1. Gibney, M.J. et al. (2004). Public Health Nutrition; Blackwell Publication.<br>2. Mudambi, S.R. and Rajagopal, M.V. (2007). Fundamentals of Foods, Nutrition and Diet Therapy; Fifth Edn; New Age International Publishers.<br>3. Srilakshmi, B. (2007). Food Science; Fourth Ed; New Age International (P) Ltd. | | | |
| **Website Link** | 1. https://bit.ly/4aBeyyc<br>2. https://bit.ly/3UjM9Hn<br>3. https://bit.ly/4cUDhPE | | | |
| **Self-study material** | 1. https://bit.ly/4dTBNpf | | | |
| | **L-Lecture** | **T-Tutorial** | **P-Practical** | **C-Credit** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | | | **Course Type** | | | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M4UZOS04** | **FOOD NUTRITION AND HEALTH** | | | | | **SEC THEORY - IV** | | | **IV** | **2** | **2** | **-** | **-** | **2** |
| **CO - PO Mapping** | | | | | | | | | | | | | | |
| **CO Number** | **P01** | **P02** | **P03** | **P04** | **P05** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | | | | |
| **CO1** | S | S | L | S | S | S | S | M | S | M | | | | |
| **CO2** | S | S | M | M | S | S | S | S | S | S | | | | |
| **CO3** | M | S | S | M | S | S | S | S | M | S | | | | |
| **CO4** | S | S | S | S | S | S | S | M | S | M | | | | |
| **CO5** | S | S | S | M | S | S | S | S | M | S | | | | |
| **Level of Correlation between CO and PO** | **L-LOW** | | | | | **M-MEDIUM** | | | **S-STRONG** | | | | | |
| **Tutorial Schedule** | - | | | | | | | | | | | | | |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation | | | | | | | | | | | | | |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE | | | | | | | | | | | | | |
| **Designed By** | **Verified By** | | | | | | | | **Approved By Member Secretary** | | | | | |
| **Dr. M. PRABU** | **Dr. D. SUGANYA** | | | | | | | | **Dr. S. SHAHITHA** | | | | | |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M4UZOS05** | **RADIATION BIOLOGY** | **SEC THEORY - V** | **IV** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Students will gain the knowledge about radiation sources and their defects and application. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Scope of Radiation Biology**<br>Sources of natural radiation - Terrestrial and cosmic sources - Man made radiations - Medical (occupational and diagnostic). Types of radiation - Ionizing and non-ionizing radiation. | K2 | 5 |
| II | **Properties of radiation**<br>Radiation units (Becquerel, RAD, Gray and Curie, Sievert). Measurement of radiation in the environment - Alpha and beta counters and Scintillometer. | K5 | 4 |
| III | **Biological effects of radiation**<br>Cellular level - Organ and system level - Genetic effects (chromosomal aberrations), radiation induced mutations - Radiation sickness - Syndromes - Cancer induction - Dosimetry. | K4 | 5 |
| IV | **Radiation safety measures**<br>Safety standards disposal of radioactive waste management, administrative and legislative aspects of radiation protection. Nuclear reactors - Nuclear energy programme in India. Regulatory authorities - AERB, BARC, DAE, IAEA and ICRP. | K3 | 5 |
| V | **Applications of Radioisotopes in Biology**<br>Autoradiography, Radioimmunoassay - Agriculture - Insect, pest and disease management - Sterile Insect Technology (SIT); Medicine (Therapy and diagnosis); Food preservation.<br>***Current trends**: Consequences of Radiation Exposure. | K4 | 5 |
| | ***Self-study** | | |
| **Course Outcome** | **CO1:** Relating the scope and industrial application of radiation. | K2 | |
| | **CO2:** Evaluate the properties and measure of radiation units. | K5 | |
| | **CO3**: Examine the biological effect of radiation. | K4 | |
| | **CO4:** Classify the different types of radiation measures. | K3 | |
| | **CO5:** Analyze the various types and biological application of radioisotopes. | K4 | |

| Learning Resources | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Rao, B.M. (2002), Radioactive Materials, Himalayas Publishing House.<br>2. Klein, S.B. and Mendonca, M.S. (2023). Fundamentals of Radiation Biology. World Scientific Publishing Co. Pvt. Ltd. | | | |
| **Reference Books** | 1. Charles A. Kelsey., Philip H. Heintz., Gregory D. Chambers., Daniel J. Sandoval., Natalie L. Adolphi, and Kimberly S. Paffett. (2014). Radiation Biology of Medical Imaging. 1st edition. Publisher: Wiley-Blackwell.<br>2. Kelsey, C.A., Heintz, P.H., Chambers, G.D. Sandoval, D.J., Adolphi, N.L. *et al*. (2014). Radiation Biology of Medical Imaging. First edition. Wiley-Blackwell Publishers.<br>3. Susan B Klein and Marc S Mendonca, (2023). Fundamentals of Radiation Biology. World Scientific Publisher, Europe. | | | |
| **Website Link** | 1. www.cnsc-ccsn.gc.ca/eng/resources/radi<br>2. www.intechopen.com/chapters/62736 | | | |
| **Self-study material** | 1. https://bit.ly/3QZWeqG | | | |
| | **L-Lecture** | **T-Tutorial** | **P-Practical** | **C-Credit** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M4UZOS05 | RADIATION BIOLOGY | | | SEC THEORY - V | IV | 2 | 2 | - | - | 2 |

| CO - PO Mapping | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | L | M | M | M | M | S | M | M | S | S |
| CO2 | S | S | M | S | S | S | M | M | S | S |
| CO3 | S | L | M | S | S | M | S | S | M | S |
| CO4 | M | M | S | S | M | S | S | M | S | S |
| CO5 | S | S | M | S | S | S | S | S | S | S |
| Level of Correlation between CO and PO | L-LOW | | | | | M-MEDIUM | | | S-STRONG | |

| | |
|---|---|
| Tutorial Schedule | - |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. D. AMERASAN | Dr. D. SUGANYA | Dr. S. SHAHITHA |

B.Sc., ZOOLOGY abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards
Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

| S.No. | SEM | COURSE_CODE | TITLE OF THE COURSE |
|---|---|---|---|
| 1 | I | 23M1UZON01 | ANIMAL BEHAVIOUR |
| 2 | I | 24M1UZON01 | ANIMAL BEHAVIOUR |
| 2 | II | 23M1UZON02 | WILDLIFE CONSERVATION AND MANAGEMENT |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZON01** | **ANIMAL BEHAVIOUR** | **NMEC-I** | **I** | **2** | **2** | | | **2** |
| **Objective** | Students know the origin and development of animal behaviour and to understand the influence of genetics, environment on animal behaviours. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| 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. | K2 | 12 |
| II | **Evolution and Social Behaviour** : Sexual selection, Altruism, Sexual strategy and social organisation, Animal perception, Neural control of behaviour, Sensory processes and perception, Visual adaptations to unfavourable environments. | K4 | 12 |
| III | **Animal and the Environment**: Coordination and Orientation, Homeostasis and Behaviour, Physiology and Behaviour in changing environments, Animal Learning, Conditioning and Learning, Biological aspects of learning, Cognitive aspects of learning. | K4 | 12 |
| IV | **Understanding Complex Behaviour** :Instinct and learning, Displacement activities, Ritualization and Communication, Decision making behaviour in Animals, Complex behaviour of honey bees, Evolutionary optimality, Mechanism of Decision making. The mentality of Animals : Languages and mental representation, non-verbal communication in human, mental images, Intelligence, tool use and culture, Animal awareness and Emotion. | K4 | 12 |
| V | **Chronobiology** : Organization of circadian system in multicellular animals; Concept of central and peripheral clock system; Circadian pacemaker system in invertebrates with particular reference to Drosophila; Photoreception and photo-transduction; The physiological clock and measurement of day length; Molecular bases of seasonality; The relevance of biological clocks for human welfare - Clock function (dysfunction). | K6 | 12 |
| **Course Outcome** | After completion of the course, students should be able to | | |
| | **CO1:** Recall and record genetic basis and evolutionary history of behaviour | K2 | |
| | **CO2:**Classify movement and migration behaviors and explain environmental influence upon behaviour | K4 | |
| | **CO3:** Analyze and identify innate, learned and cognitive behavior and differentiate between various mating systems. | K4 | |

| | | |
|---|---|---|
| | **CO4:** Assess complexity involved in behavioural traits and evaluate hormones and their role in aggression and reproduction. | K4 |
| | **CO5:** Discuss the rhythmicity of behavioural expressions and the scientific concepts in behavior and behavioral ecology. | K6 |

| **Learning Resources** | |
|---|---|
| **Text Books** | 1. Ayyar, E.K. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. II (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 891p.<br>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, 1151 pp. |
| **Reference Books** | 1. Newman, H.H., 1981. The Phylum Chordata, Satish Book Enterprise, Agra – 282 003, 477 pp.<br>2. 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. 1065 pp. |
| **Website Link** | 1. https://bit.ly/3cLjOqe<br>2. https://bit.ly/3KN5ABO<br>3. https://bit.ly/3BdNgyt |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M3UZON01** | **ANIMAL BEHAVIOUR** | | | | **NMEC-I** | **I** | **2** | **2** | | | **2** |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | M | L | S | S | S | M | M |
| CO2 | M | L | S | L | M | S | M | M | L | S |
| CO3 | S | S | M | L | M | M | S | S | M | M |
| CO4 | S | M | S | M | L | S | S | S | S | S |
| CO5 | M | L | M | M | M | M | S | M | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By** |
|---|---|---|
| **Dr. D. AMARESAN** | **Dr. D. SUGANYA** | **Head CDC** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2024-2025 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **24M1UZON01** | **ANIMAL BEHAVIOUR** | **NMEC-I** | **I** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Learners to learn the origin and development of animal behaviour and to understand the influence of genetics, environment on animal behaviours. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Genetics and Behaviour** : Genetic material, Genes and chromosomes, Genetic variation, Single and Polygenic inheritance of behaviour, Heritability of behaviour, Natural selection and behaviour, Darwinian fitness, Evolution of adaptive strategies. | K2 | 5 |
| II | **Evolution and Social Behaviour** : Sexual selection, Altruism, Sexual strategy and social organisation, Animal perception, Neural control of behaviour, Sensory processes and perception, Visual adaptations to unfavourable environments. | K4 | 5 |
| III | **Animal and the Environment**: Coordination and Orientation, Homeostasis and Behaviour, Physiology and Behaviour in changing environments, Animal Learning, Conditioning and Learning, Biological aspects of learning, Cognitive aspects of learning. | K4 | 5 |
| IV | **Understanding Complex Behaviour** :Instinct and learning, Displacement activities, Ritualization and Communication, Decision making behaviour in Animals, Complex behaviour of honey bees, Evolutionary optimality, Mechanism of Decision making. | K4 | 4 |
| V | **Chronobiology** : Organization of circadian system in multicellular animals; Concept of central and peripheral clock system; Circadian pacemaker system in invertebrates with particular reference to Drosophila; Photoreception and photo- transduction. | K6 | 5 |
| **Course Outcome** | **CO1:** Recall and record genetic basis and evolutionary history of behaviour | K2 | |
| | **CO2:**Classify movement and migration behaviors and explain environmental influence upon behaviour | K4 | |
| | **CO3:** Analyze and identify innate, learned and cognitive behavior and differentiate between various mating systems. | K4 | |

| | | |
|---|---|---|
| | **CO4:** Assess complexity involved in behavioural traits and evaluate hormones and their role in aggression and reproduction. | K4 |
| | **CO5:** Discuss the rhythmicity of behavioural expressions and the scientific concepts in behavior and behavioral ecology. | K6 |

| **Learning Resources** | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Ayyar, E.K. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. II (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 891p.<br>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, 1151 pp. | | | |
| **Reference Books** | 1. Newman, H.H., 1981. The Phylum Chordata, Satish Book Enterprise, Agra – 282 003, 477 pp.<br>2. 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. 1065 pp. | | | |
| **Website Link** | 1. https://bit.ly/3cLjOqe<br>2. https://bit.ly/3KN5ABO<br>3. https://bit.ly/3BdNgyt | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2024-2025 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **24M1UZON01** | **ANIMAL BEHAVIOUR** | | | **NMEC-I** | **I** | **2** | **2** | **-** | **-** | **2** |

**CO-PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | M | L | S | S | S | M | M |
| CO2 | M | L | S | L | M | S | M | M | L | S |
| CO3 | S | S | M | L | M | M | S | S | M | M |
| CO4 | S | M | S | M | L | S | S | S | S | S |
| CO5 | M | L | M | M | M | M | S | M | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. AMARESAN** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2024-2025 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **24M2UZON02** | **WILDLIFE CONSERVATION AND MANAGEMENT** | **NMEC-II** | **II** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Students will evaluate and integrate all the related areas like Fundamentals in Ecology, Forestry, Natural Resource Conservation approaches and develop the role PVA models for protection of Endangered species | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | **Biodiversity Extinction and Conservation Approaches :** Perspectives and Expressions. Identification and prioritization of Ecologically sensitive area (ESA). Coarse filter and fine filter approaches. Regional and National approaches for biodiversity conservation. | K2 | 5 |
| II | **Theory and Analysis of Conservation of Populations:** Stochastic perturbations - Environmental, Demographic, spatial and genetic stochasticity. Population viability analysis-conceptual foundation, uses of PVA models. Management Decisions for small populations using PVA models. Minimum viable populations & recovery strategies for threatened species. | K4 | 5 |
| III | **National and International Efforts for Conservation :** International agreements for conserving marine life, Convention on wetlands of International Importance (Ramsar convention), Conservation of Natural Resources. Overview of conservation of Forest &Grassland resources. CITES, IUCN, CBD National Forest Policy, 1988, National Wildlife Action Plan 2017-2031, Wildlife Protection Act 1972, National and State Biodiversity Action Plans and other Forests and Environmental Acts | K4 | 4 |
| IV | **Wildlife in India :** Wildlife wealth of India & threatened wildlife, Reasons for wildlife depletion in India, Wildlife conservation approaches and limitations. Wild life Habitat: Characteristic, Fauna and Adaptation with special reference to Tropical forest. Protected Area concept: National Parks, Sanctuaries and Biosphere Reserves, cores and Buffers, Nodes and corridors. Community Reserve and conservation Reserves. | K4 | 5 |

| | | | |
|---|---|---|---|
| V | **Management of Wildlife :** Distribution, status. Habitat utilization pattern, threats to survival of Slender Loris, Musk deer, Great Indian Bustard, Olive Ridley turtle. Wild life Trade & legislation, Assessment, documentation, Prevention of trade, Wild life laws and ethics | K6 | 5 |
| **Course Outcome** | **CO1: R**ecall the importance of wildlife, extinction and Conservation Approaches of wildlife. | K2 | |
| | **CO2:** Integrate and assess the National, international approaches for biodiversity conservation | K4 | |
| | **CO3:** Differentiate threats to wildlife, various action plans, conservation strategies on wildlife of India to turn conflict into tolerance and coexistence | K4 | |
| | **CO4:** Explain the role PVA models, Wildlife conservation approaches, and limitations | K4 | |
| | **CO5:** Construct and simulate National and International strategies for Conservation, Wild life laws and ethics. | K6 | |

## Learning Resources

| | |
|---|---|
| **Text Books** | 1. Paul R. Krausman, James W. Cain (2013) Wildlife Management and Conservation: Contemporary Principles and Practices, JHU Press<br>2. Anthony R. E. Sinclair, John M. Fryxell, Graeme Caughley (2006) Wildlife Ecology, Conservation and Management, Wiley Publication |
| **Reference Books** | 1. Milner-Gulland, E. J. , Ruth Mace (2009) Conservation of Biological Resources, Wiley Publication.<br>2. Graeme Caughley, John M. Fryxell, Anthony R. E. Sinclair (2006) **Wildlife Ecology, Conservation and Management, 2nd Edition,** Wiley Publication. |
| **Website Link** | 1. https://bit.ly/3cLjOqe<br>2. https://bit.ly/3KN5ABO<br>3. https://bit.ly/3BdNgyt |

| | | | | |
|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2024-2025 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | | | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **24M2UZON02** | **WILDLIFE CONSERVATION AND MANAGEMENT** | | | | **NMEC-II** | **II** | **2** | **2** | **-** | **-** | **2** |

**CO-PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | S | S | M | L | S | S | S | M | M |
| CO2 | M | L | S | L | M | S | M | M | L | S |
| CO3 | S | S | M | S | S | M | M | S | S | M |
| CO4 | S | M | S | M | L | S | S | S | S | S |
| CO5 | M | L | M | S | M | M | S | M | M | S |
| Level of Correlation between CO and PO | L-LOW | | | | | M-MEDIUM | | | S-STRONG | |

| | |
|---|---|
| **Tutorial Schedule** | |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| **Designed By** | **Verified By** | **Approved By Member Secretary** |
|---|---|---|
| **Dr. D. AMARESAN** | **Dr. D. SUGANYA** | **Dr. S. SHAHITHA** |

B.Sc., ZOOLOGY abstract under LOCF-CBCS Pattern with effect from 2023-2024 Onwards
Structure of Credit Distribution as per the TANSCHE / UGC Guidelines

| S.No. | SEM | COURSE_CODE | TITLE OF THE COURSE |
|---|---|---|---|
| 1 | I | 23M1UZOA01 | ALLIED ZOOLOGY-I |
| 2 | II | 23M2UZOA02 | ALLIED ZOOLOGY-II |
| 3 | II | 23M2UZOAP1 | ALLIED ZOOLOGY PRACTICALS |

| B.Sc. – Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOA01** | **ALLIED ZOOLOGY-I** | **GEC THEORY - I** | **I** | **4** | **2** | **2** | **-** | **3** |
| **Objective** | Students will learn the diversity and organization of various level of organisation | | | | | | | |

| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
|---|---|---|---|
| **I** | Invertebrata - Principles of taxonomy. Criteria for classification – Symmetry and Coelom – Binomial nomenclature. General characters and Structure of Protozoa -Paramecium, Porifera - Leucosolenia, Coelenterata -Aurelia | K2 | 8 |
| **II** | General characters and Structure of Helminthes - Fasciola hepatica and Annelid - Leech, Arthropoda – Cockroach, Mollusca - Fresh water mussel and Echinodermata – Starfish. | K3 | 7 |
| **III** | Classification and External characters of Prochordata – Cephalochordata - Amphioxus, Pisces- Shark and Amphibia - Frog. | K3 | 7 |
| **IV** | Classification and External characters of Reptilia - Calotes, Aves - Pigeon and Mammalia - Rabbit. | K3 | 7 |
| **V** | Animal organization: Structure and organization of (i) Earthworm (ii) Fish (iii) Rat | K3 | 7 |
| **Course Outcome** | **CO1:** Recall the characteristic features invertebrates and chordates. | K2 | |
| | **CO2:** Classify invertebrates up to class level and chordates up to order level | K3 | |
| | **CO3:** Explain and discuss the structural and functional organisation of some invertebrates and chordates | K3 | |
| | **CO4:** Relate the adaptations and habits of animals to their habitat | K3 | |
| | **CO5** : Analyze the taxonomic position of animals. | K3 | |

| Learning Resources | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Ekambaranatha Iyer,-Outlines of Zoology, Viswanathan Publication Tortora, G.J., Funke, B.R., Case, C.L. (2013). Microbiology. An Introduction 11th Edition. ALa Carte Pearson.<br>2. Jordan E.L. and P.S. Verma-Invertebrate Zoology, S.Chand & Co. | | | |
| **Reference Books** | 1. Ekambaranatha Iyar and T.N. Ananthakrishnian - A Manual of Zoology Invertebrata-Voll: Viswanathan Publishers.<br>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. | | | |
| **Website Link** | 1. www.sanctuaryasia.com<br>2. www.iaszoology.com | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc - CHEMISTRY Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | **Course Type** | | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M1UZOA01** | **ALLIED ZOOLOGY-I** | | **GEC THEORY - I** | | **I** | **4** | **2** | **2** | **-** | **3** |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | S | S | M | S | S | S | S | S | S |
| CO2 | S | M | S | S | M | S | S | S | S | S |
| CO3 | S | S | S | S | S | S | S | M | S | S |
| CO4 | S | S | S | M | S | S | S | S | S | S |
| CO5 | S | S | S | M | S | S | S | S | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | Group Discussion, Quiz program, Model preparation and Kahoot app, |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| **Dr. D. AMARASAN** | **Dr.D.SUGANYA** | **Dr. S. SHAHITHA** |

| B.Sc. – Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M2UZOA02** | **ALLIED ZOOLOGY-II** | **GEC THEORY - II** | **II** | **4** | **2** | **2** | **-** | **3** |

| **Objective** | Students to learn the basic concepts of immunity and the working of immune organs and familiarize them with the recommended vaccination schedule | | |
|---|---|---|---|
| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
| **I** | Respiration - Respiratory pigments and transport of gases. Mechanism of blood clotting. Types of excretory products – Ornithine cycle. Structure of neuron – Conduction of nerve impulse, Mechanism of vision and hearing | K2 | 7 |
| **II** | Fertilization, Cleavage, Gastrulation and Organogenesis of Frog; Placentation in mammals. | K4 | 7 |
| **III** | Immunity Innate and Acquired - Active and Passive; Antigens and Antibodies; Immunological organs – responses in humans; Vaccination schedule. | K4 | 8 |
| **IV** | Human Genetics: Human Chromosomes – Sex Determination in Humans; Patterns of Inheritance: Autosomal Dominant, Autosomal Recessive, X-linked, Y-linked, Mitochondrial, Multiple Allelic and Polygenic; Genetic Counselling. | K5 | 7 |
| **V** | Animal Behaviour: Foraging, Courtship Behaviour, Shelter and Nest Construction, Parental Care, Learning Behaviour. | K5 | 7 |
| **Course Outcome** | **CO1:** Recall the parts and working of body organs and developmental stages, name the patterns of inheritance and list different types of animal behaviour | K2 | |
| | **CO2:** Analyse the different developmental stages | K4 | |
| | **CO3:** Analyse the working of body and immune systems | K4 | |
| | **CO4:** Analyse the different patterns of inheritance | K5 | |
| | **CO5 :** Relate the behaviour of animals to physiology. Analyse the different types of behaviour | K5 | |

## Learning Resources

| | |
|---|---|
| **Text Books** | 1. Ayyar, E.K. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. II (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 891p.<br>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, 1151 pp. |
| **Reference Books** | 1. Owen, J. A., Punt, J. & Stranford, S. A. – Kuby (2013) Immunology. New York: W.H. Freeman & Company.<br>2. Klug, W. S., Cummings, M. R. & Spencer, C (2020) Concepts of Genetics. (12th ed.). New Jersey: Pearson Education |

| | | | | |
|---|---|---|---|---|
| **Website Link** | 1.www.sanctuaryasia.com<br>2.www.iaszoology.com | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc - CHEMISTRY Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | | **Course Type** | | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M2UZOA02** | **ALLIED ZOOLOGY-II** | | **GEC THEORY - II** | | **II** | **4** | **2** | **2** | **-** | **3** |

**CO-PO Mapping**

| CO Number | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | M | S | S | M | S | S | S | S | S | S |
| CO2 | L | M | S | S | M | S | S | S | M | S |
| CO3 | S | S | M | S | S | S | S | M | S | S |
| CO4 | S | S | S | M | S | S | S | S | S | S |
| CO5 | M | S | S | M | S | S | S | S | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | |
|---|---|
| **Tutorial Schedule** | Group Discussion, Quiz program, Model preparation and Kahoot app, |
| **Teaching and Learning Methods** | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| **Assessment Methods** | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. M.PRABU | Dr.D.SUGANYA | Dr. S. SHAHITHA |

| B.Sc. – Chemistry Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M2UZOAP1** | **ALLIED ZOOLOGY PRACTICALS** | **GEC PRACTICAL -I** | **II** | **2** | **-** | **-** | **2** | **2** |

| **Objective** | Students will understand the taxonomic position, body organization and evolutionary relationship of animals. | | |
|---|---|---|---|
| **Unit** | **Course Content** | **Knowledge Levels** | **Sessions** |
| **MAJOR PRACTICAL** | a. Cockroach/Fish –Digestive.<br>b. Qualitative detection of excretory products (Ammonia, Urea, Uric acid). | K3 | 10 |
| **MINOR PRACTICAL** | a. Mouth parts of Honey Bee, Mosquito.<br>b. Fish – cycloid scale, ctenoid scale and placoid scale.<br>c. ABO blood group. | K3 | 8 |
| **SPOTTERS** | Amoeba, Paramecium, Trypanosoma, Euglena, Plasmodium, Leucosolenia, Sycon sponge, Aurelia, Obelia, planaria, Liver fluke, Tapeworm, Cockroach, Planaria, Earthworm, Nereis, Leech, Prawn/Shrimp, Scorpion, Grasshopper, Fresh water mussel, Pila, Starfish. Protochordata and Vertebrata – Amphioxus, Shark, Catla, Frog, Salamander, Calotes, Chamaeleon, Turtle, Cobra, Viper, Pigeon, Rat, Bat, Rabbit. Colour Blindness, Haemophilia, Klinefelter"s syndrome, Down"s syndrome. | K5 | 10 |
| **Course Outcome** | **CO1**: Familiar with practical skills in the use of tools, technologies and methods common to microbiology and physiology. | K3 | |
| | **CO2**: Understand the organization level with their systematic function | K3 | |
| | **CO3:** Apply the evolutionary relationship to different morphological characters | K5 | |
| | **CO4:** Apply knowledge and come to know how to handle different organisms | K5 | |
| | **CO5 :** Analyze and to observe various specimens by using Microscope. | K5 | |

| Learning Resources | | | | |
|---|---|---|---|---|
| **Text Books** | 1. Arumugam N. (2013). Developmental Zoology, Saras Publication, Nagercoil, Tamilnadu,India.<br>2. Das S. (2020).Microbiology Practical Manual, CBS Publication, Delhi. | | | |
| **Reference Books** | 1. Singh HR and Neerajkumar. (2014). Animal Physiology and Biochemistry, Vishal PublishingCo. Jalandhar, Delhi.<br>2. Jayasurya, Arumugam N, Dulsy Fatima. (2013). Practical Zoology Vol 3, Saras Publication,Nagercoil, Tamilnadu, India. | | | |
| **Website Link** | 1. www.sanctuaryasia.com<br>2. www.iaszoology.com | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc - CHEMISTRY Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | Course Type | Sem. | Hours | L | T | P | C | |
| 23M2UZOAP1 | ALLIED ZOOLOGY PRACTICALS | | GEC PRACTICAL-I | II | 2 | - | - | 2 | 2 | |
| CO-PO Mapping | | | | | | | | | | |
| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | M | S | M | M | S | S | S | S | S | S |
| CO2 | S | M | L | S | M | M | S | S | S | S |
| CO3 | S | S | S | S | S | S | M | M | S | S |
| CO4 | S | S | S | M | S | S | S | S | S | S |
| CO5 | S | M | S | M | S | S | S | S | M | S |
| Level of Correlation between CO and PO | L-LOW | | | | | M-MEDIUM | | | S-STRONG | |
| Tutorial Schedule | | | | | | | | | | |
| Teaching and Learning Methods | 1.Practical demonstration<br>2. Virutual Dissections<br>3. Observations of specimens | | | | | | | | | |
| Assessment Methods | 1. Model practical's<br>2. Observation<br>3. Record | | | | | | | | | |
| Designed By | | | Verified By | | | | | Approved By Member Secretary | | |
| Dr.D.AMARASAN | | | Dr.D.SUGANYA | | | | | Dr. S. SHAHITHA | | |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| urse Code | Course Title | Course Type | Sem. | Hours | L | T | P | C |
| 23M5UZOIS1 | INTERNSHIP | INTERNSHIP | V | 15 Days | - | - | - | 2 |

| | |
|---|---|
| **Objective** | Students acquired the working environment of various industries and research institutions / Company. During this period, the Students will get hands on training in the diverse areas of zoology. |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| I | Duration of the Internship Programme is 15 Days During the Vacation which falls at the end of the 4th Semester | K4 | 15 Days |
| II | Students may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry / Government organizations / Micro, Small, Medium enterprises to make them ready for the industry. The students will select the institutions, industries and trainer like Clinical Lab / Sugarcane Industry / Aquaculture Industries / Diary / Marine Research Station/ Poultry Farm / Soil Testing Organic Farming / Medical Coding / TNAU/ Veterinary University / Molecular Biology Lab / Hospitals / Vermitechnology Unit / Mushroom Production Unit and zoology relevant companies / Industries / research institutes. | | |
| III | A staff member of a department (Advisor) will be monitoring the performance of the candidate | | |
| IV | Students submit their request letter/profile/ interest areas may be submitted to the particular industry/Company for their willingness for providing the internship program. | | |
| V | After Getting the acceptance/permission from the internship provider, the student must submit the Joining Report / Letters / Email to the department by in person. | | |
| VI | Student will maintain the work diary and attending internship properly in the selected Institute / company / Lab. | | |

| | | | |
|---|---|---|---|
| **VII** | Every student is required to prepare a file containing documentary proofs of the activities done by them like Student's Diary and Internship Report. After the successful completion of their training, Students should collect the Internship training certificate, Attendance and work diary duly signed by the internship programme in-charge of the institute. | | |
| **VIII** | Student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. | | |
| **IX** | Internship report should be soft cover book bound, the cover of the repot should be of white color printed with black ink and the text for printing should be identical as prescribed for the title page. The Internship Training Certificate also included in the report. | | |
| **X** | The evaluation of these activities will be done by Internship advisor of the department/ Head of the Department/Industrial experts/Subject experts | | |
| **Course Outcome** | After completion of the course, students should be able to | | |
| | **CO1:** Career development opportunities, providing practical experience in a field or discipline. | **K4** | |
| | **CO2:** Gain the knowledge about hands on training in the diverse areas of Zoology | **K4** | |
| | **CO3:** Acquire employment contacts leading directly to a full-time job following graduation from college | **K4** | |
| | **CO4:** Identify, write down, and carry out performance objectives (mutually agreed upon by the employer and the student) related to their job assignment | **K4** | |
| | **CO5:** Deal with industry-professionals and ethical issues in the work environment | **K4** | |

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|---|---|---|---|---|
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M5UZOIS1 | INTERNSHIP | | | INTERNSHIP | V | 15 Days | - | - | - | 2 |

| CO - PO Mapping | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| CO1 | S | S | M | M | M | S | L | M | S | S |
| CO2 | S | S | S | S | M | S | S | S | S | S |
| CO3 | S | S | M | S | L | M | S | M | S | M |
| CO4 | M | M | L | S | S | S | S | S | M | M |
| CO5 | S | S | S | S | M | M | M | M | M | S |
| Level of Correlation between CO and PO | L-LOW | | | | | M-MEDIUM | | | S-STRONG | |

| | |
|---|---|
| Tutorial Schedule | |
| Teaching and Learning Methods | Audio Video lecture, Chalk and Board class, Assignment, PPT Presentation and Video presentation |
| Assessment Methods | Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. D. SUGANYA | Dr. D. SUGANYA | Dr. S. SHAHITHA |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOPR1** | **PROJECT WORK** | **PROJECT WORK** | **VI** | **7** | **-** | **-** | **7** | **4** |
| **Objective** | Students to inculcate/impart skills on project design, experimental execution and research reporting and enhance their skills as on writing a dissertation | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| **Format for the preparation of Project Report** | The final stage of work consists of the<br>1. Title Page<br>2. Bonafide Certificate<br>3. Acknowledgement<br>4. Table of contents<br>5. List of tables and figures<br>6. Abbreviation | **K2** | - |
| **Text of the Project** | The following structure of project work should be followed to maintain the uniformity in preparation and presentation.<br>**Chapter 1 - Introduction**<br>This chapter explains the selection of the topic and its relevance, definitions of related aspects, characteristics, different concepts pertaining to the topic etc can be covered by the candidate.<br>**Chapter 2 - Aim and Objectives**<br>This chapter describes the primary goal of the project, how it intends to accomplish it.<br>**Chapter 3 - Review of Literature**<br>This chapter gives clear cut information about studies done on the respective topic/research. This would assist students to undertake further study on the same topic/research.<br>**Chapter 4 - Materials and Methods**<br>This chapter is the vital component of the topic/research. It describes all the procedures and methods used for their work in detail with flow charts.<br>**Chapter 5 - Result**<br>This chapter presents the Research Findings. Results tables and figures to be in colour.<br>**Chapter 6 - Discussion**<br>Interpret their work with the previous research findings.<br>**Chapter 7 - Conclusion/Summary**<br>The chapter provides as the overview of the key research findings.<br>If required, more chapters of data analysis could be added.<br>**Chapter 8 - Bibliography** | **K4** | - |
| **Typing** | Paper: 8 ½ * 11 inches in size. Only one side of the sheet should be typed. | **K4** | - |

| | | | |
|---|---|---|---|
| **Instruction** | Margin: The left side margin should not be less than 1.5 inches (or 40 mm) the right, top and Bottom Margin one inch (or 25 mm).<br>Font: Times New Roman, subject matter -12 font size in running format, Heading and Section headings should be capitalized – 14 font size and line space is 1.5. | | |
| **Headings and Titles** | 1. Heading and Section headings should be capitalized and centered– 14 font sizes with Bold.<br>2. Subdivision headings should be typed from the left hand margin sentence case -12 font sizes with Bold.<br>3. Paragraphs should be indented seven space for pica type and nine for elite type. | **K4** | - |
| **Tables and Figures** | 1. The table number (E.g.: Table.1/ Figure.1/Graph.1) typed in capitals should be separated from the text by two or three spaces.<br>2. An asterisk should be used if an explanatory note to a time is necessary.<br>3. The note should be placed immediately below the table.<br><br>**Line Spacing:** The text of the thesis should be 1.5 lines spacing<br>**Pagination:** Pages of the text are numbered continuously in Arabic numerals. | **K4** | - |
| **Bibliography** | Any works of other researchers, if used either directly or indirectly, should be indicated at appropriate places in the report/thesis. The citation may assume any one of the following forms. APA Style.<br>APA in-text citation style uses the author's last name and the year of publication, for example: Kuby, 2005 / Verma and Agarwal, 2005 / Verma *et al*. 2005.<br>For citing Books<br>Fuller, C. (2019) Platelets. Cambridge: Biostate Publishing. p 33-39.<br>Citing Journal<br>Abdullah, M., Atta, A., and Allohedan, H. (2018) Green synthesis of hydrophobic magnetite nanoparticles coated with plant extract and their application as petroleum oil spill collectors. Nanomaterials, 8(1):855-859.<br>For citing Thesis or Dissertation<br>Saranya. A (2020) A study of Nanoparticle Synthesis, unpublished Ph.D. Thesis, Indian Institute of Technology Chennai. | **K3** | - |
| **Binding specification** | The thesis should be hardcover book bound, the cover of the thesis should be of in color printed with black ink and the text for printing should be identical as prescribed for the title page. | | |

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|---|---|---|---|---|---|---|
| **SCHEDULE** | VI Semester:<br>1. November- Selection of topic<br>2.December – Literature Collection & Design the project<br>3. January – Execution of their designed work<br>4. February – Report Preparation, First and Second draft, and Final draft Correction.<br>5. March-Review Presentation & Submission of Project. | | | | | |
| **Course Outcome** | **CO1:** Provide the opportunity to do research in reputed Institutes/Laboratories | | | | K2 | |
| | **CO2:** Integrating the experimental design and execution of their research | | | | K4 | |
| | **CO3:** Interpret the research work/topic with the previous findings | | | | K4 | |
| | **CO4:** Analyze their research work and its importance | | | | K4 | |
| | **CO5:** Design their project and enhance the thesis writing skill | | | | K4 | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit | | |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | | | Course Type | Sem. | Hours | L | T | P | C |
| 23M6UZOPR1 | PROJECT WORK | | | PROJECT WORK | VI | 7 | - | - | 7 | 4 |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | M | S | S | S | S | M | M | M | M |
| CO2 | L | M | M | M | S | S | S | S | L | S |
| CO3 | S | S | M | M | M | L | S | M | M | M |
| CO4 | M | M | S | S | S | S | S | S | S | L |
| CO5 | M | L | M | M | S | M | S | M | L | M |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **Tutorial Schedule** | - | | |
| **Teaching and Learning Methods** | - | | |
| **Assessment Methods** | Review Meeting-I | : | 15 Marks |
| | Review Meeting-II | : | 15 Marks |
| | Attendance | : | 5 Marks |
| | Student Work Diary | : | 5 Marks |
| | Project presentation | : | 40 Marks |
| | Project Presentation | : | 40 Marks |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. D. SUGANYA | Dr. D. SUGANYA | Dr. S. SHAHITHA |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Course Code** | **Course Title** | **Course Type** | **Sem.** | **Hours** | **L** | **T** | **P** | **C** |
| **23M6UZOOE1** | **ZOOLOGY FOR COMPETITIVE EXAMINATION** | **PROFESSIONAL COMPETENCY SKILL** | **VI** | **2** | **2** | **-** | **-** | **2** |
| **Objective** | Students will identify the problem related to their area of interest in Zoology, enhance problem solving skills and research knowledge. | | | | | | | |

| Unit | Course Content | Knowledge Levels | Sessions |
|---|---|---|---|
| | Assemblage of different topics related to Zoology in particular, Invertebrate, Chordate, Animal Physiology, Developmental Biology, Genetics, Cell Biology, Molecular Biology, Microbiology, Immunology, Sericulture, Apiculture, Vermiculture, Poultry Science, Pisciculture, etc. Major emphasis has been put forth to include recent developments in the subjects. This course aims to give a holistic view of all the topics which comprised of some factual text points, multiple choice questions (MCQ), it is extremely suitable for students pursuing their higher degree in University/Institute for their entrance exams, students preparing for various national and state level competitive entrance exams to get admission in higher education in Zoology. In addition, it is also useful for CSIR, TNPSC, UPSC, ICAR, ICMR, etc.<br><br>**Rules for creating MCQ pattern.**<br><br>1. Objective type online examination will be conducted at the end of 6$^{th}$ semester.<br><br>2. Questions must be taken from all previous question papers of CSIR, TNPSC, UPSC, ICAR, ICMR, etc.<br><br>3. **Test critical thinking.**<br><br>Multiple choice questions to test the superficial knowledge. Learners to interpret facts, evaluate situations, explain cause and effect, make inferences, and predict results.<br><br>4. **Emphasize Higher-Level Thinking**<br><br>Use memory-plus application-oriented questions. These questions require students to recall principles, rules or facts | | |

| | | | |
|---|---|---|---|
| | in a real-life context.<br><br>5. **Mix up the order of the correct answers**<br><br>Keep correct answers in random positions and don't let them fall into a pattern that can be detected<br><br>**6. Use a Question Format**<br><br>Multiple-choice items to be prepared as questions (rather than incomplete statements)<br><br>Incomplete Statement Format:<br><br>The capital of California is in Direct Question Format------ Less effective.<br><br>In which of the following cities is the capital of California? - This is best format.<br><br>**7. Keep Option Lengths Similar**<br><br>Avoid making your correct answer the long or short answer<br><br>**8. Avoid the "All the Above" and "None of the Above" Options**<br><br>Students merely need to recognize two correct options to get the answer correct<br><br>**9.** HOD's instruct to the faculty to prepare minimum 500 questions booklet (cumulatively for each programme) with solutions and circulate among the students.<br><br>**10.** Each Department to prepare the Questions (MCQ pattern with four answers) and submit to ICT. | | |
| **Course Outcome** | **CO1:** Identification of pattern of questions asked in competitive exams | K2 | |
| | **CO2:** Analyze the topics that are repeated in competitive exams | K4 | |
| | **CO3: C**ategorize the topics and select the topics of their interest | K4 | |
| | **CO4:** Ability to solve problems related to each topic | K4 | |
| | **CO5:** Get confidence about appearing for competitive exams | K4 | |
| **Learning Resources** | | | |

| | | | | |
|---|---|---|---|---|
| **Textbooks** | 1. Agarwal V.K. 2016. Zoology for Degree Students. First edition. S. Chand, Publishing, India.<br>2. Osbors, H. 2021. Economic Zoology: An Introductory Textbook in Zoology. Special Reference to Its Applications in Agriculture, Commerce, and Medicine. Legare Street Press, India. | | | |
| **Reference Books** | 1. Khanna Editorial Team, 2017. Zoology (For All Indian Universities MSc Entrance Examination), Khanna publisher.<br>2. Sharma, S.K. 2018. Objective Zoology. PART 1 and 2. Krishna Prakashan Publisher. | | | |
| **Website Link** | 1. https://bit.ly/3vPHd3k<br>2. https://bit.ly/3VSLPjN<br>3. https://bit.ly/3Uf9lGv<br>4. https://bit.ly/3Ug1GYL<br>5. https://bit.ly/3xv3eoF | | | |
| | L-Lecture | T-Tutorial | P-Practical | C-Credit |

| B.Sc. - Zoology Syllabus LOCF - CBCS with effect from 2023-2024 Onwards | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | Course Type | Sem. | Hours | L | T | P | C | |
| 23M6UZOOE1 | ZOOLOGY FOR COMPETITIVE EXAMINATION | PROFESSIONAL COMPETENCY SKILL | VI | 2 | 2 | - | - | 2 | |

**CO - PO Mapping**

| CO Number | P01 | P02 | P03 | P04 | P05 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | S | S | M | M | M | S | L | S | S | S |
| CO2 | S | S | M | M | M | S | L | M | S | S |
| CO3 | S | M | S | S | S | S | M | M | S | S |
| CO4 | S | M | M | S | M | S | L | S | S | S |
| CO5 | S | S | M | S | S | S | M | S | M | S |

| Level of Correlation between CO and PO | L-LOW | M-MEDIUM | S-STRONG |
|---|---|---|---|

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|---|---|
| Tutorial Schedule | CSIR, TNPSC, UPSC,ETC., previous year question papers with solutions-online mock test |
| Teaching and Learning Methods | Self-study, Group discussion, Chalk and Talk, Audio-Video Learning, learning through mock test |
| Assessment Methods | 100 multiple choice questions through computer based online examinations passing minimum is 50% |

| Designed By | Verified By | Approved By Member Secretary |
|---|---|---|
| Dr. D. SUGANYA | Dr. D. SUGANYA | Dr. S. SHAHITHA |