



**V.V.VANNIAPERUMAL COLLEGE FOR WOMEN**  
(Belonging to Virudhunagar Hindu Nadars)  
An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai  
Re-accredited with 'A' Grade (3<sup>rd</sup> Cycle) by NAAC  
**VIRUDHUNAGAR - 626 001**

**OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM  
REGULATIONS AND SYLLABUS  
(with effect from Academic Year 2023 - 2024)**

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 13 UG Programmes (Aided), 14 UG Programmes (SF), 13 PG Programmes and 6 Ph.D. Programmes. The curricula for all these Programmes, except Ph.D. Programmes, have been framed as per the guidelines given by the University Grants Commission (UGC) & Tamil Nadu State Council for Higher Education (TANSCHÉ) under Choice Based Credit System (CBCS) and the guidelines for Outcome Based Education (OBE).

The Departments of Commerce, English, History, Mathematics, Biochemistry and Tamil upgraded as Research Centres offer Ph.D. Programmes as per the norms and regulations of Madurai Kamaraj University, Madurai and do not come under the purview of CBCS.

**A. CHOICE BASED CREDIT SYSTEM (CBCS)**

The CBCS provides an opportunity for the students to choose Courses from the prescribed Courses. The CBCS is followed as per the guidelines formulated by the UGC. The performance of students is evaluated based on the uniform grading system. Computation of the Cumulative Grade Point Average (CGPA) is made to ensure uniformity in evaluation system.

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**List of Programmes in which CBCS/Elective Course System is implemented**

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**UG PROGRAMMES**

Arts & Humanities	:	History (E.M. & T.M.), English, Tamil
Physical & Life Sciences	:	Mathematics, Zoology, Chemistry, Physics, Biochemistry, Home Science - Nutrition and Dietetics, Costume Design and Fashion, Microbiology, Biotechnology, Computer Science, Information Technology, Computer Applications and Computer Applications - Graphic Design
Commerce & Management	:	Commerce, Commerce (Computer Applications), Commerce (Professional Accounting), Business Administration

**PG PROGRAMMES**

Arts & Humanities	: History, English, Tamil
Physical & Life Sciences	: Mathematics, Physics, Chemistry, Zoology, Biochemistry, Home Science - Nutrition and Dietetics, Computer Science, and Computer Applications (MCA) *
Commerce & Management	: Commerce, Business Administration (MBA) *

\* AICTE approved Programmes

**OUTLINE OF CHOICE BASED CREDIT SYSTEM – UG**

1. Core Courses
2. Discipline Specific Elective Courses (DSEC)
3. Elective Courses
4. Skill Enhancement Courses (SEC)
5. Non Major Elective Courses (NMEC)
6. Ability Enhancement Compulsory Courses (AECC)
7. Generic Elective Courses (GEC)
8. Self Study Courses
9. Extra Credit Courses (Self Study Courses) (Optional)

**List of Non Major Elective Courses (NME)****(2023-2024 onwards)****UG PROGRAMMES**

Name of the Course	Course Code	Semester	Department
Introduction to Tourism	23UHIN11	I	History(EM)
Indian Constitution	23UHIN21	II	History(EM)
சுற்றுலா ஓர் அறிமுகம்	23UHIN11	I	History (TM)
இந்திய அரசியலமைப்பு	23UHIN21	II	History(TM)
Popular Literature and Culture	23UENN11	I	English
English for Professions	23UENN21	II	
பேச்சுக்கலைத்திறன்	23UTAN11	I	Tamil
பயன்முறைத் தமிழ்	23UTAN21	II	
Practical Banking	23UCON11	I	Commerce (Aided)
Basic Accounting Principles	23UCON22	II	
Financial Literacy-I	23UCON12	I	Commerce (SF)
Financial Literacy -II	23UCON21	II	
Self-Employment and Startup Business	23UCCN11	I	Commerce CA (SF)
Fundamentals of Marketing	23UCCN21	II	
Women Protection Laws	23UCPN11	I	Commerce (Professional)

Basic Labour Laws	23UCPN21	II	Accounting)
Basics of Event Management	23UBAN11	I	Business Administration
Business Management	23UBAN21	II	
Quantitative Aptitude I	23UMTN11	I	Mathematics
Quantitative Aptitude II	23UMTN21	II	
Physics for Everyday life -I	23UPHN11	I	Physics
Physics for Everyday life -II	23UPHN21	II	
Food Chemistry	23UCHN11	I	Chemistry
Drugs and Natural Products	23UCHN21	II	
Ornamental fish farming and Management	23UZYN11	I	Zoology
Biocomposting for Entrepreneurship	23UZYN21	II	
Foundations of Baking and Confectionery	23UHSN11	I	Home Science – Nutrition and Dietetics
Basic Nutrition and Dietetics	23UHSN21	II	
Nutrition and Health	23UBCN11	I	Biochemistry
Life Style Diseases	23UBCN21	II	
Social and Preventive Medicine	23UMBN11	I	Microbiology
Nutrition & Health Hygiene	23UMBN21	II	
Herbal Medicine	23UBON11	I	Biotechnology
Organic farming and Health Management	23UBON21	II	
Basics of Fashion	23UCFN11	I	Costume Design And Fashion
Interior Designing	23UCFN21	II	
Office Automation	23UCSN11	I	Computer Science
Introduction to Internet and HTML 5	23UCSN21	II	
Office Automation	23UITN11	I	Information Technology
Introduction to HTML	23UITN21	II	
Introduction to HTML	23UCAN11	I	Computer Applications
Fundamentals of Computers	23UCAN21	II	
Introduction to HTML	23UGDN11	I	Computer Applications - Graphic Design
Fundamentals of Computers	23UGDN21	II	
Organic Farming	23UBYN11	I	Botany
Nursery and Landscaping	23UBYN12		
Mushroom Cultivation	23UBYN21	II	
Medicinal Botany	23UBYN22		
Cadet Corps for Career Development I	23UNCN11	I	National Cadet Corps
Cadet Corps for Career Development II	23UNCN21	II	

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**List of Ability Enhancement Compulsory Courses (AECC) &  
Generic Elective Courses (GEC) Offered**

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**ABILITY ENHANCEMENT COMPULSORY COURSES (AECC)**

1. Value Education
2. Environmental Studies

## **GENERIC ELECTIVE COURSES 1**

1. Human Rights
2. Women Studies

## **GENERIC ELECTIVE COURSES 2**

1. Constitution of India
2. Modern Economics
3. Adolescent Psychology
4. Disaster Management

## **B. OUTCOME BASED EDUCATION (OBE) FRAMEWORK**

The core philosophy of Outcome Based Education rests in employing a student - centric learning approach to measure the performance of students based on a set of pre-determined outcomes. The significant advantage of OBE is that it enables a revamp of the curriculum based on the learning outcomes, upgrade of academic resources, quality enhancement in research and integration of technology in the teaching –learning process. It also helps in bringing clarity among students as to what is expected of them after completion of the Programme in general and the Course in particular. The OBE directs the teachers to channelize their teaching methodologies and evaluation strategies to attain the PEOs and fulfill the Vision and Mission of the Institution.

### **Vision of the Institution**

The founding vision of the Institution is to impart Quality Education to the rural womenfolk and to empower them with knowledge and leadership quality.

### **Mission of the Institution**

The mission of the Institution is to impart liberal education committed to quality and excellence. Its quest is to mould learners into globally competent individuals instilling in them life-oriented skills, personal integrity, leadership qualities and service mindedness.

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## **B.1 Programme Educational Objectives, Programme Outcomes and Programme Specific Outcomes**

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It is imperative for the institution to set the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Course Outcomes (COs), consistent with its Vision and Mission statements. The PEOs and the POs should be driven by the mission of the institution

and should provide distinctive paths to achieve the stated goals. The PEOs for each Programme have to fulfill the Vision and Mission of the Department offering the Programme.

### **Vision of the Department of Zoology**

- To cater the students to be competent in the field of life science and responsible for the betterment of society.

### **Mission of the Department of Zoology**

- To impart the quality education to meet out the needs of rural women folk.
- To motivate them to apply the academic skills for the improvement of society.
- To mould the students to be responsible and successful citizens.

### **B.1.1 Programme Educational Objectives (PEOs)**

PEOs are broad statements that describe the career and professional achievements that the Programme is preparing the graduates to achieve within the first few years after graduation. PEOs are framed for each Programme and should be consistent with the mission of the Institution.

### **Programme Educational Objectives (PEOs) of B.Sc. Zoology Programme**

#### **The students will be able to**

- To mould the students into efficient professionals in educational Institutions, Research centres, Medical laboratory, Zoos, Museums etc.
- To empower the learners with skills to promote self-employment opportunities.
- To uphold the moral standards of students to enable them to face challenges in life and to be better citizens.

<b>Key components of mission statement</b>	<b>PEO1</b>	<b>PEO2</b>	<b>PEO3</b>
To impart quality education to meet out the needs of rural women folk.	√	√	-
To mould the students to be responsible and successful citizens.		√	√
To motivate them to apply the academic skills for the improvement of society.	√	√	√

### **B.1.2 Programme Outcomes (POs)**

POs shall be based on Graduate Attributes (GAs) of the Programme. The GAs are the attributes expected of a graduate from a Programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co-operation/Team Work, Scientific Reasoning, Reflective Thinking, Information/Digital Literacy, Multicultural Competence, Moral and Ethical Awareness/Reasoning, Leadership Qualities and Lifelong Learning.

#### **On successful completion of the Programme, the students will be able to**

- 1 apply effectively the acquired knowledge and skill in the field of Arts, Physical Science, Life Science, Computer Science, Commerce and Management for higher studies and employment. (*Disciplinary Knowledge*)
- 2 articulate innovative thoughts and ideas proficiently in both in spoken and written forms. (*Communication Skills*)
- 3 identify, formulate and solve problems in real life situations scientifically / systematically by adapting updated skills in using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)
- 4 critically analyse, synthesize and evaluate data, theories and ideas to provide valid suggestions through assignments, case studies, Internship and projects for the fulfillment of the local, national and global developmental needs. (*Critical Thinking and Analytical Reasoning*)
- 5 use ICT in a variety of self-directed lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning*)
- 6 self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence*)
- 7 uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness*)

### **B.1.3 Programme Specific Outcomes (PSOs)**

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each UG Programme. Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are Programme specific. It is mandatory that each PO should be mapped to the respective PSO.

**On completion of B.Sc. Zoology Programme, the students will be able to**

**PO1- *Disciplinary Knowledge***

**PSO 1.a:** Apply their knowledge of fundamental principles in biological sciences to pursue higher studies in interdisciplinary subjects and compete in their profession.

**PSO 1.b:** Use their practical skills gained in various branches of Biology to promote their career, entrepreneurial skills and research activities.

**PO2-*Communication Skills***

**PSO 2:** Communicate the biological concepts confidently in interviews and career for their personal betterment and extension programmes to create awareness among the villagers.

**PO3- *Scientific Reasoning and Problem Solving***

**PSO 3.a:** Identify the causes for the environmental and health issues by the application of biological principles.

**PSO 3.b:** Solve the problems in the management of quality of environmental resources and culture units of economically valuable animals by adapting the scientific methods.

**PO4 - *Critical thinking and Analytical Reasoning***

**PSO 4.a:** Design innovative projects for the betterment of their research endeavors in the various branches of animal sciences.

**PSO 4.b:** Design self employment units with the knowledge gained in applied biology to promote self employment and entrepreneurship in the society.

**PSO5- *Digital Literacy, Self - directed and Lifelong Learning***

**PSO 5:** Use their computer skills in M.S Office to compete in their higher education, competitive examinations and career.

**PO6 - *Cooperation/Team Work and Multi-Cultural Competence***

**PSO 6:** Work efficiently with team spirit in a team for its success by the skills acquired through internship programmes and group practicals and assignments.

**PO7 –*Moral and Ethical Awareness***

**PSO 7:** Could develop scientific responsibilities regarding the disposal of wastes, usage of natural products instead of chemicals in day today life and preservation of fauna in their locality.

### PO-PEO Mapping Matrix

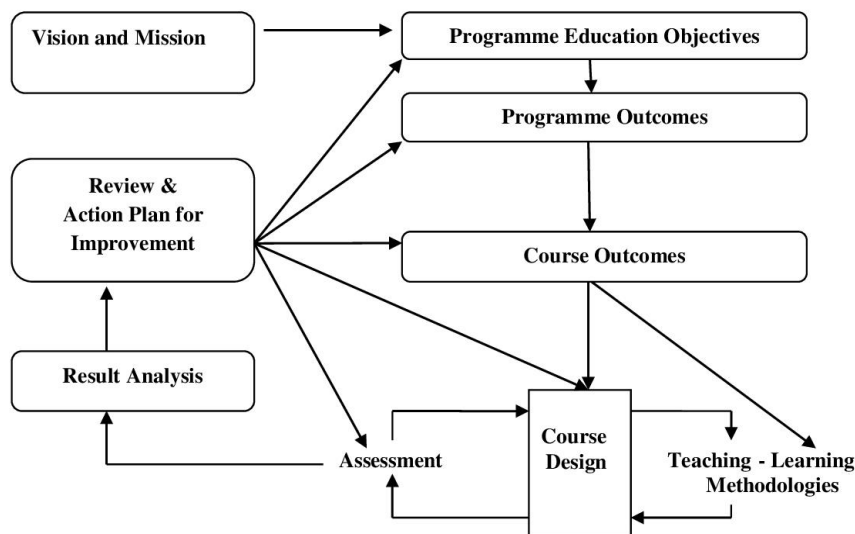
Attainment of PEOs can be measured by a PO-PEO matrix. PEOs should evolve through constant feedback from alumnae, students, industry, management, *etc.* It is mandatory that each PEO should be mapped to at least one of the POs.

PEOs POs/PSOs	PEO1	PEO2	PEO3
PO1/PSO1.a	-	✓	✓
PO1/PSO1.b	✓	✓	✓
PO2/PSO2.a	✓	✓	-
PO2/PSO2.b	✓	✓	-
PO3/PSO3	-	✓	✓
PO4/PSO4.a	-	✓	✓
PO4/PSO4.b	✓	✓	-
PO5/PSO5	✓	✓	-
PO6/PSO6	-	✓	✓
PO7/PSO7	-	-	✓

#### B.1.4 Course Outcomes (COs)

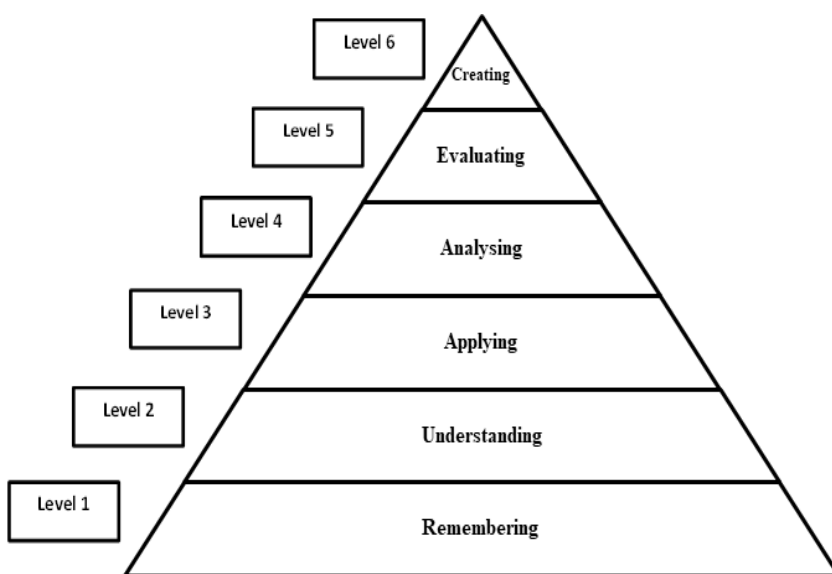
Course Outcomes are narrow statements restricted to the Course contents given in five units. Course Outcomes describe what students would be capable of, after learning the contents of the Course. They reflect the level of knowledge gained, skills acquired and attributes developed by the students after learning of Course contents. COs are measurable, attainable and manageable in number. COs contribute to attain POs in such a way that each CO addresses at least one of the POs and also each PO is reasonably addressed by adequate number of COs.





It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom’s Taxonomy levels.

**BLOOM’S TAXONOMY**



**CO – PO Mapping of Courses**

After framing the CO statements, the COs framed for each Course is mapped with POs based on the relationship that exists between them. The COs which are not related to any of the POs is indicated with (-), signifying Nil. Measurement Mapping is based on Four Points Scale [High (H), Medium (M), Low (L) and Nil (-)]. For calculating weighted percentage of

contribution of each Course in the attainment of the respective POs, the weights assigned for H, M and L are 3, 2 and 1 respectively.

### CO-PO/PSO Mapping Table (Course Articulation Matrix)

PO/PSOs COs	PO1/ PSO1	PO2/ PSO2	PO3/ PSO3	PO4/ PSO4	PO5/ PSO5	PO6/ PSO6	PO7/ PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

### ELIGIBILITY FOR ADMISSION

The candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamil Nadu or any other equivalent examination accepted by the Academic Council with Biology or Zoology and Botany as one of the subjects in Higher Secondary Course.

### DURATION OF THE PROGRAMME

The candidates shall undergo the prescribed Programme of study for a period of three academic years (six semesters).

### MEDIUM OF INSTRUCTION

English

### COURSES OFFERED

Part I	:	Tamil/Hindi/Alternate Course
Part II	:	English
Part III	:	Core Courses
	:	Elective Courses
	:	Elective Courses: Discipline Specific Elective Courses
	:	Self Study Course
Part IV	:	Skill Enhancement Courses (SEC)
	:	Field Project/Internship
	:	Non-Major Elective Courses (NMEC)
	:	Ability Enhancement Compulsory Courses (AECC)
	:	Generic Elective Courses (GEC)
Part V	:	Self Study Course
	:	National Service Scheme/ Physical Education/ Youth Red Cross Society/ Red Ribbon Club/ Science Forum/ Eco Club/ Library and Information Science/ Consumer Club/ Health and Fitness Club and National Cadet Corps/ Rotaract Club

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## B.2 EVALUATION SCHEME

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**B.2.1.PART II**

Components	Internal Assessment Marks	Summative Examination Marks	Total Marks
Theory	15	75	100
Practical	5+5	-	

**INTERNAL ASSESSMENT****Distribution of Marks**

Mode of Evaluation	Marks
Periodic Test	: 15
Practical	: 5+5
<b>Total</b>	<b>: 25</b>

**Three Periodic Tests - Average of the best two will be considered**

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### **B.2.2.Part I & PART III - Core Courses, Discipline Specific Elective Courses & Elective Courses**

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Components	Internal Assessment Marks	External Examination Marks	Total Marks
Theory	25	75	<b>100</b>

**INTERNAL ASSESSMENT****Distribution of Marks****Theory**

Mode of Evaluation	Marks
Internal Test	: 15
Assignment	: 5
Quiz	: 5
<b>Total</b>	<b>: 25</b>

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

**Practical**

<b>Mode of Evaluation</b>		<b>Marks</b>
Internal Test	:	30
Record & Performance	:	10
<b>Total</b>		<b>40</b>

Internal Test - Average of the best two will be considered

**Question Pattern for Internal Tests****Duration: 2 Hours**

<b>Section</b>	<b>Q. No.</b>	<b>Types of Question</b>	<b>No. of Questions</b>	<b>No. of Questions to be answered</b>	<b>Marks for each Question</b>	<b>Total Marks</b>
A	1 - 4	Multiple Choice	4	4	1	4
B	5 -6	Internal Choice - Either ... or Type	3	3	7	21
C	8 -9	Internal Choice - Either... or Type	2	2	10	20
<b>Total</b>						<b>45*</b>

\*The total marks obtained in the Internal Test will be calculated for 15 marks

**SUMMATIVE EXAMINATION****Question Pattern****Duration: 3 Hours**

<b>Section</b>	<b>Q. No.</b>	<b>Types of Question</b>	<b>No. of Questions</b>	<b>No. of Questions to be answered</b>	<b>Marks for each Question</b>	<b>Total Marks</b>
A	1 -10	Multiple Choice	10	10	1	10
B	11 - 15	Internal Choice – Either ...or Type	5	5	7	35
C	16 - 18	Internal Choice – Either... or Type	3	3	10	30
<b>Total</b>						<b>75</b>

### B.2.3 PART IV - Skill Enhancement Courses, Non Major Elective Courses and Foundation Course

#### INTERNAL ASSESSMENT

#### Distribution of Marks

#### Theory

Mode of Evaluation		Marks
Internal Test	:	15
Assignment	K2 Level	5
Quiz	K2 Level	5
<b>Total</b>		<b>25</b>

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

#### Question Pattern for Periodic Tests

**Duration: 1 Hour**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 3	Internal Choice - Either... or Type	3	3	5	15
B	4	Internal Choice – Either ...or Type	1	1	10	10
					<b>Total</b>	<b>25</b>

#### Summative Examination

Mode of Evaluation	Marks
Summative Examination	50
Multiple Choice Questions (K2 Level)	25
<b>Total</b>	<b>75</b>

**Question Pattern****Duration: 2 Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either... Or Type	5	5	6	30
B	6 - 7	Internal Choice – Either... Or Type	2	2	10	20
					<b>Total</b>	<b>50</b>

**B.2.6. Part V – Extension Activities**

Assessment by Internal Examiner only

**Distribution of Marks**

Mode of Evaluation	Marks
Attendance	: 5
Performance	: 10
Report/Assignment/Project/Camp/Practical	: 10
<b>Total</b>	<b>: 25*</b>

\*The marks obtained will be calculated for 100 marks

**ELIGIBILITY FOR THE DEGREE**

- The candidate will not be eligible for the Degree without completing the prescribed Courses of study, lab work, *etc.*, and a minimum Pass marks in all the Courses.
- No Pass minimum for Internal Assessment.
- Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Discipline Specific Elective Courses and Allied Courses.
- Pass minimum for External Examination is 21 marks out of 60 marks for Skill Enhancement Courses and Non Major Elective Courses.
- The aggregate minimum pass percentage is 40.
- Pass minimum for External Practical Examination is 21 marks out of 60 marks.
- Pass minimum for Ability Enhancement Compulsory Courses and Generic Elective Courses is 40 marks.
- Pass minimum for Self Study Courses is 40 marks.

- Attendance
  - For UG, PG Programmes,
    - a) The students who have attended the classes for 76 days (85%) and above are permitted to appear for the Summative Examinations without any condition.
    - b) The students who have only 60-75 days (66% - 84%) of attendance are permitted to appear for the Summative Examinations after paying the required fine amount and fulfilling other conditions according to the respective cases.
    - c) The students who have attended the classes for 59 days and less – upto 45 days (50% - 65%) can appear for the Summative Examinations only after getting special permission from the Principal.
    - d) The students who have attended the classes for 44 days or less (<50%) cannot appear for the Summative Examinations and have to repeat the whole semester.
      - For Part V in UG Programmes, the students require 75 % of attendance to get a credit.
      - For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.

These rules come into effect from 2020-2021 onwards.

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### **B.3 ASSESSMENT MANAGEMENT PLAN**

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An Assessment Management Plan that details the assessment strategy both at the Programme and the Course levels is prepared. The continuous assessment is implemented using an assessment rubric to interpret and grade students.

#### **B.3.1 Assessment Process for CO Attainment**

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a Course. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

**Direct Assessment (Rubric based)** - Conventional assessment tools such as Term Test, Assignment, Quiz and End Semester Summative Examination are used.

**Indirect Assessment** – Done through Course Exit Survey.

#### **CO Assessment Rubrics**

For the evaluation and assessment of COs and POs, rubrics are used. Internal assessment contributes 40% and End Semester assessment contributes 60% to the total attainment of a CO for the theory Courses. For the practical Courses, internal assessment contributes 50% and Semester assessment contributes 50% to the total attainment of a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

## CO Attainment

### Direct CO Attainment

Course Outcomes of all Courses are assessed and the CO – wise marks obtained by all the students are recorded for all the assessment tools. The respective CO attainment level is evaluated based on set attainment rubrics.

### Target Setting for Assessment Method

For setting up the target of internal assessment tools, 55% of the maximum mark is fixed as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

### Formula for Attainment for each CO

Attainment = Percentage of students who have scored more than the target marks

$$\text{Percentage of Attainment} = \frac{\text{Number of Students who scored more than the Target}}{\text{Total Number of Students}} \times 100$$

### Attainment Levels of COs

Assessment Methods	Attainment Levels	
Internal Assessment	Level 1	50% of students scoring more than set target marks in Internal Assessment tools
	Level 2	55% of students scoring more than set target marks in Internal Assessment tools
	Level 3	60% of students scoring more than set target marks in internal Assessment tools
End Semester Summative Examination	Level 1	50% of students scoring more than average marks in End Semester Summative Examination
	Level 2	55% of students scoring more than average marks in End Semester Summative Examination
	Level 3	60% of students scoring more than average marks in End Semester Summative Examination



### Indirect CO Attainment

At the end of each Course, an exit survey is conducted to collect the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students about the Course Outcomes.

**Overall CO Attainment= 75% of Direct CO Attainment + 25 % of Indirect CO Attainment**

In each course, the level of attainment of each CO is compared with the predefined targets. If the target is not reached, the Course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the Course teacher can set the target as a value greater than the CO attainment of the previous year.

### B.3.2 Assessment Process for Overall PO Attainment

With the help of CO -PO mapping, the PO attainment is calculated. PO assessment is done by giving 75% weightage to direct assessment and 25% weightage to indirect assessment. Direct assessment is based on CO attainment, where 75% weightage is given to attainment through End Semester examination and 25% weightage is given to attainment through internal assessments. Indirect assessment is done through Graduate Exit Survey and participation of students in Co-curricular/ Extra curricular activities.

### PO Assessment Tools

Mode of Assessment	Assessment Tool	Description
Direct Attainment (Weightage -75%)	CO Assessment	This is computed from the calculated CO Attainment value for each Course
Indirect Attainment (Weightage - 25%)	Graduate Exit Survey 10%	At the end of the Programme, Graduate Exit Survey is collected from the graduates and it gives the opinion of the graduates on attainment of Programme Outcomes
	Co-curricular/ Extra-curricular activities 15%	For participation in Co-curricular/Extra-curricular activities during the period of their study.

**Programme Articulation Matrix (PAM)**

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Average Direct PO Attainment								
Direct PO Attainment in percentage								

**Indirect Attainment of POs for all Courses**

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Graduate Exit Survey							
Indirect PO Attainment							

**Attainments of POs for all Courses**

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Direct Attainment (Weightage - 75%)							
Indirect Attainment (Weightage - 25%)							
Overall PO Attainment							

**Overall PO Attainment= 75% of Direct PO Attainment +  
25% of Indirect PO Attainment (Graduate Exit Survey  
& Participation in Co- curricular and  
Extra curricular Activities)**

**Expected Level of Attainment for each of the Programme Outcomes**

POs	Level of Attainment
Attainment Value $\geq 70\%$	Excellent
$60\% \leq$ Attainment Value $< 70\%$	Very Good
$50\% \leq$ Attainment Value $< 60\%$	Good
$40\% \leq$ Attainment Value $< 50\%$	Satisfactory
Attainment Value $< 40\%$	Not Satisfactory

**Level of PO Attainment**

<b>Graduation Batch</b>	<b>Overall PO Attainment (in percentage)</b>	<b>Whether Expected Level of PO is Achieved? (Yes/No)</b>

**B.3.3 Assessment Process for PEOs**

The curriculum is designed so that all the Courses contribute to the achievement of PEOs. The attainment of PEOs is measured after 5 years of completion of the Programme only through indirect methods.

**Target for PEO Attainment**

<b>Assessment Criteria</b>	<b>Target (UG)</b>	<b>Target (PG)</b>
Record of Employment	15% of the class strength	30% of the class strength
Progression to Higher Education	50% of the class strength	5% of the class strength
Record of Entrepreneurship	2% of the class strength	5% of the class strength

**Attainment of PEOs**

<b>Assessment Criteria &amp; Tool</b>	<b>Weightage</b>
Record of Employment	10
Progression to Higher Education	20
Record of Entrepreneurship	10
Feedback from Alumnae	30
Feedback from Parents	10
Feedback from Employers	20
<b>Total Attainment</b>	<b>100</b>

$$\text{Percentage of PEO Attainment from Employment} = \frac{\text{Number of Students who have got Employment}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Higher Education} = \frac{\text{Number of Students who pursue Higher Education}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Entrepreneurship} = \frac{\text{Number of Students who have become Entrepreneurs}}{\text{Target}} \times 100$$

**Expected Level of Attainment for each of the Programme Educational Objectives**

<b>POs</b>	<b>Level of Attainment</b>
Attainment Value $\geq 70\%$	Excellent
$60\% \leq$ Attainment Value $< 70\%$	Very Good
$50\% \leq$ Attainment Value $< 60\%$	Good
$40\% \leq$ Attainment Value $< 50\%$	Satisfactory
Attainment Value $< 40\%$	Not Satisfactory

**Level of PEO Attainment**

<b>Graduation Batch</b>	<b>Overall PEO Attainment (in percentage)</b>	<b>Whether Expected Level of PEO is Achieved? (Yes/No)</b>

**C. PROCESS OF REDEFINING THE PROGRAMME EDUCATIONAL OBJECTIVES**

The college has always been involving the key stakeholders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected the objectives of the Programme are defined, refined and are inscribed in the form of PEOs. The level of attainment of PEOs defined earlier will be analyzed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like Board of Studies, Academic Council and Governing Body may recommend appropriate actions. As per the Outcome Based Education Framework implemented from the Academic Year 2020 -2021, the following are the Programme Structure, the Programme Contents and the Course Contents of B.Sc. Zoology Programme



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**VIRUDHUNAGAR - 626 001**

### BACHELOR OF SCIENCE ZOOLOGY (2018)

Outcome Based Education with Choice Based Credit System

Programme Structure - Allotment of Hours and Credits

For those who join in the Academic Year 2023-2024

Components	Semester						Total Number of Hours (Credits)
	I	II	III	IV	V	VI	
<b>Part I : Tamil /Hindi</b>	6 (3)	6 (3)	6 (3)	6 (3)	-	-	24 (12)
<b>Part II : English</b>	6 (3)	6(3)	6 (3)	6 (3)	-	-	24 (12)
<b>Part III : Core Courses, Discipline Specific Elective Courses, Allied Courses &amp; Self Study Course</b>							
Core Course	5 (5)	5 (5)	5 (5)	4 (4)	5 (5)	5 (5)	29 (29)
Core Course	-	-	-	-	5 (4)	5 (5)	10 (9)
Core Course	-	-	-	-	4 (4)	5(4)	9(8)
Core Course Practical	3(2)	3 (2)	3 (2)	3 (2)	3 (2)	3 (2)	18(12)
Core Course Project	-	-	-	-	1 (1)	-	1 (1)
DSEC	-	-	-	-	5(4)	5 (4)	10 (8)
DSEC Practical	-	-	-	-	3(2)	3(2)	6(4)
Elective Course I	4 (3)	4 (3)	-	-	-	-	8(6)
Elective Course I Practical I	2 (1)	2 (1)	-	-	-	-	4(2)
Elective Course II	-	-	4 (3)	4 (3)	-	-	8(6)
Elective Course II Practical II	-	-	2 (1)	2 (1)	-	-	4 (2)
Self Study Course	-	-	-	-	-	0 (1)	0 (1)
<b>Part IV : Skill Enhancement Courses, Non Major Elective Courses, Ability Enhancement Compulsory Courses, Generic Elective Courses, Self Study Course &amp; Internship/ Field Project</b>							
SEC	2 (2)	-	1 (1)	-	-	-	3(3)
SEC	-	2 (2)	2 (2)	2 (2)	2 (2)	2 (2)	10 (10)
SEC						2 (2)	2 (2)
Non Major Elective Course	2 (2)	2 (2)	-	-	-	-	4 (4)
AECC - Value Education	-	-	-	-	2 (2)	-	2 (2)
AECC - Environmental Studies	-	-	-	2 (2)	-	-	2 (2)
GEC -1	-	-	1 (1)	-	-	-	1 (1)
GEC -2	-	-	-	1 (1)	-	-	1 (1)
Self Study Course	-	-	-	-	0 (1)	-	0 (1)
Internship/ Field Project	-	-	-	0 (1)	-	-	0 (1)
<b>Part V : Extension Activities</b>	-	-	-	0 (1)	-	-	0 (1)
<b>Total</b>	<b>30 (21)</b>	<b>30 (21)</b>	<b>30 (21)</b>	<b>30 (23)</b>	<b>30 (27)</b>	<b>30 (27)</b>	<b>180 (140)</b>
Extra Credit Course (Self Study Course)	-	-	-	-	0(2)	-	0(2)

DSEC: Discipline Specific Elective Course

AECC: Ability Enhancement Compulsory Course

SEC: Skill Enhancement Course

GEC: Generic Elective Course



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## BACHELOR OF ZOOLOGY -2018

### PROGRAMME CONTENT

#### SEMESTER I

2023-2024 onwards

S.No.	Components		Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks		
								Int.	Ext.	Total
1.	<b>Part I</b>		Tamil/Hindi	23UTAG11/ 23UHDG11	6	3	3	25	75	100
2.	<b>Part II</b>		English	23UENG11	6	3	3	25	75	100
3.	<b>Part III</b>	Core Course -1	Invertebrata	23UZYC11	5	5	3	25	75	100
4.		Core Course -2 Practical I	Invertebrata Practical	23UZYC11P	3	2	3	40	60	100
5.		Elective Course –I	Plant Diversity and Cell Biology	23UBTA11	4	3	3	25	75	100
6.		Elective Course – I Practical I	Plant Diversity and Cell Biology Practical	23UBTA11P	2	1	3	40	60	100
7.	<b>Part IV</b>	NME-1	Ornamental fish farming and Management	23UZYN11	2	2	3	25	75	100
8.		SEC – 1 Foundation Course	Fundamentals of Zoology	23UZYP11	2	2	3	25	75	100
<b>Total</b>					<b>30</b>	<b>21</b>		<b>800</b>		

**BACHELOR OF SCIENCE ZOOLOGY**  
**PROGRAMME CONTENT**  
**SEMESTER II**

S. No.	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int .	Ext.	Total	
1.	<b>Part I</b>	Tamil/Hindi	23UTAG21/ 23UHGD21	6	3	3	25	75	100	
2.	<b>Part II</b>	English	23UENG21	6	3	3	25	75	100	
3.	<b>Part III</b>	Core Course –3	Chordata	23UZYC21	5	5	3	25	75	100
4.		Core Course – 4 Practical II	Chordata Practical	23UZYC21P	3	2	3	40	60	100
5.		Elective Course –I	Taxonomy of Angiosperms and Plant Physiology	23UBTA21	4	3	3	25	75	100
6		Elective Course –I Practical -II	Taxonomy of Angiosperms and Plant Physiology Practical	23UBTA21P	2	1	3	40	60	100
7.	<b>Part IV</b>	NME-2	Biocomposting for Entrepreneurship	23UZYN21	2	2	3	25	75	100
8		SEC-2	Wildlife Conservation and Management	23UZYS21	2	2	3	25	75	100
<b>Total</b>				<b>30</b>	<b>21</b>				<b>800</b>	



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**VIRUDHUNAGAR - 626 001**

**B.Sc. Zoology**

**(2023-2024 onwards)**

Semester I	<b>INVERTEBRATA</b>	Hours/Week: 5	
Core Course - 1		Credits: 5	
Course Code <b>23UZYC11</b>		Internal 25	External 75

### Course Outcomes:

The students will be able to

CO1: recall the taxonomic position of animals [K1]

CO2: explain the structure and functions of organs and organ systems of invertebrates. [K2]

CO3: differentiate various groups of invertebrates. [K2]

CO4: to apply their knowledge to identify an invertebrate animal. [K3]

CO5: to identify the economic importance of invertebrate animals. [K3]

### UNIT I

**Protozoa:** Introduction to Classification, taxonomy and nomenclature. General characters and classification of Phylum Protozoa up to classes. Type study – *Paramecium*. Parasitic protozoan (*Entamoeba and Plasmodium*). Nutrition, Locomotion and Economic importance of Protozoans. **Porifera:** General characters and classification up to Classes. Type study - Ascon. Skeleton in sponges, Canal system and Reproduction in sponges. Economic importance of sponges. (15 Hours)

### UNIT II

**Coelenterata :** General characters and classification upto classes – Type study – *Obelia* colony. Polymorphism in Hydrozoa. Corals and coral reefs, Economic importance of corals and coral reefs. **Platyhelminthes:** General characters and classification of upto classes. Type study – *Fasciola hepatica*. Nematode Parasites and diseases – *Wuchereria bancrofti*, Aschelminthes: General characters and classification of upto classes. *Ascaris lumbricoides*- Sexual dimorphism and Life history. (15 Hours)



### UNIT III

**Annelida:** General characters and classification upto Classes. Type study – *Hirudinaria granulosa*. Metamerism. Reproduction in polychaetes. **Arthropoda:** General characters and classification of Phylum Arthropoda upto Classes. Detailed study: *Penaeus indicus*. Affinities of *Peripatus*, Larval forms in Crustacea. Insect pollinators - predators – parasites. (15 Hours)

### UNIT IV

**Mollusca:** General characters and classification of Phylum Mollusca upto Classes. Detailed study: *Pila globosa*. Foot and torsion in Mollusca, Economic importance of Molluscs – Cephalopoda as the most advanced invertebrate. **Echinodermata:** General characters and classification of Phylum Echinodermata upto Classes. Detailed study: *Asterias*. Water vascular system in Echinodermata – Larval forms of Echinoderms. (15 Hours)

### UNIT V

**Insect pests and management:** Pest of rice: Rice stem borer (*Scirpophaga incertulas*) – Pest of Sugarcane: The shoot borer (*Chilo infuscatellus*) – Pest of coconut: The rhinoceros beetle (*Oryctes rhinoceros*) Pest of cotton: The spotted bollworm (*Earias insulana*) – Pests of vegetables: Brinjal-The shoot and fruit borer (*Leucinodes orbonalis*) – Cauliflower: The diamond black moth (*Plutella xylostella*) Pests of fruits: Citrus butterfly (*Papilio demoleus*) – Pest of stored products: The rice weevil (*Sitophilus oryzae*). Insects associated with human diseases: Mosquitoes, housefly, bed bug, human head louse (Brief account only). Insects associated with household materials: Ants, Termites, Silver fish. Principles of Integrated Pest Management. (15 Hours)

### TEXT BOOK

1. Ekambaranatha Iyer (2000). A Manual of Zoology, 10<sup>th</sup> edition, Viswanathan, S., Printers & Publishers Pvt Ltd.
2. Jordan, E.L. and Verma P.S. (1995). Invertebrate Zoology, 12<sup>th</sup> edn. S. Chand & Co.
3. Kotpal, R.L. (1992). Protozoa, Porifera, Coelenterata, Annelida, Arthropoda.

### REFERENCE BOOKS

1. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.

- 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.
- Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson.
- Hyman L.H (1955). The invertebrates - Vol. I to Vol. VII – McGraw Hill Book Co.
- Parker, J. and Haswell. (1978). A text book of Zoology Vol.I - Williams and Williams.

### WEBSITE REFERENCES

- <https://www.nationalgeographic.com/animals/invertebrates/>
- <https://greatbarrierreef.org/>

### Mapping Table:

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
23UZYC11										
CO1	3	3	3	2	3	3	3	-	2	2
CO2	3	2	3	2	3	3	3	1	2	3
CO3	3	2	2	2	3	3	1	2	2	2
CO4	3	2	3	3	3	3	2	2	2	3
CO5	3	3	3	3	3	3	1	3	2	3

**Strong (3)    Medium (2)    Low (1)**

Dr, J. Rani

Head of the Department

Dr, J. Rani

Dr. M. Tamilselvi  
Course Designer



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VIRUDHUNAGAR - 626 001

### B.Sc. Zoology

(2023-2024 onwards)

Semester I	<b>INVERTEBRATA PRACTICAL</b>	Hours/Week: 3	
Core Course – 2 Practical I		Credits: 2	
Course Code <b>23UZYC11P</b>		Internal 40	External 60

#### Course Outcomes:

On completion of this course, students will be able to

CO1: identify the different groups of invertebrate animals based on external features .[K2]

CO2: explain the various systems in invertebrates.. [K2]

CO3: dissect and display the economically important invertebrate [K3]

CO4: compare and distinguish the dissected internal organs of lower animals.[K3]

CO5: differentiate and compare the structure, function and mode of life of various groups of animals. [K3]

**Major Dissection:** Cockroach - Digestive system, Nervous system, Reproductive system.

Earthworm: Nervous System. Prawn - Appendages.(cephalic,thoracic and abdominal)

**Minor Dissection:** Earthworm: Body and Penial setae.

**Mounting:** Mouth parts – Cockroach, Honeybee and House fly.

**Spotters :**(i). **Protozoa:** *Amoeba*, *Paramecium*, *Paramecium* -Binary fission and Conjugation, *Euglena*, *Plasmodium vivax*. (ii). **Porifera:** Sycon, Euplectella, Cliona, Spicules and Gemmule in sponges. (iii). **Coelenterata:** Obelia Colony and Medusa, Fungia and Aurelia, (iv). **Platyhelminthes:** *Planaria*, *Fasciola hepatica* and *Taenia solium*. (v). **Aschelminthes:** *Ascaris* (Male & Female) and *Wuchereria* (vi). **Annelida:** Nereis, Hirudinaria and Trochophore larva (vii). **Arthropoda:** Penaeus, Scolopendra, Sacculina, Spider and Peripatus, (viii). **Mollusca:** Pila, Sepia, Dentalium, Nautilus (ix). **Echinodermata:** Asterias, Brittle star, Sea Urchin, Sea cucumber and Sea lily.

**TEXT BOOKS**

1. EkambaranathaIyyar and T. N. Ananthakrishnan (1995) A manual of Zoology Vol.I (Part 1, 2) S. Viswanathan, Chennai
1. Ganguly, Sinha and Adhikari . (2011) . Biology of Animals: Volume I, New Central Book Agency; 3rd revised edition. 1008 pp.
2. Sinha, Chatterjee and Chattopadhyay. (2014). Advanced Practical Zoology, Books & Allied Ltd; 3rd Revised edition, 1070 pp.
3. Lal ,S. S (2016). Practical Zoology Invertebrate, Rastogi Publications.
4. Verma, P. S. (2010). A Manual of Practical Zoology: Invertebrates, S Chand, 497pp.

**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.
2. Barnes, R.D. (1982). *Invertebrate Zoology*, V Edition. Holt Saunders International Edition.
3. Barrington, E.J.W. (1979). *Invertebrate Structure and Functions*. II Edition, E.L.B.S. and Nelson
4. Boradale, L.A. and Potts, E.A. (1961). *Invertebrates: A Manual for the use of Students*. Asia Publishing Home.
5. Lal, S.S. (2005). A text Book of Practical Zoology: Invertebrate, Rastogi, Meerut

**WEBSITE REFERENCES**

1. <https://www.nationalgeographic.com/animals/invertebrates/>

**Mapping Table**

Course Code 23UZYC21P	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	2	3	3	3	3	1	3	3
CO2	3	3	2	2	3	3	2	1	3	3
CO3	3	2	2	2	3	3	3	1	3	3
CO4	3	3	2	2	3	3	3	1	3	3
CO5	3	3	2	1	3	3	3	3	2	3

**Strong (3)    Medium (2)    Low (1)**

Dr. J. Rani

Head of the Department

Dr. J. Rani

Dr. M. Tamilselvi  
Course Designers



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**VIRUDHUNAGAR - 626 001**

**B.Sc. Zoology  
(2023-2024 onwards)**

Semester I	<b>PLANT DIVERSITY AND CELL BIOLOGY</b>	Hours/Week: 4	
Elective Course - I		Credits: 3	
Allied Code <b>23UBTA11</b>		Internal 25	External 75

### Course Outcomes:

on successful completion of the course, the learners should be able to

CO1: Increase the awareness and appreciation of human friendly algae and their economic Importance. [K1]

CO2: Develop an understanding of microbes and fungi and appreciate their adaptive Strategies [K2]

CO3: Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms. [K2]

CO4: Identify the importance of cell as a basic unit of life [K3]

CO5: Interpret the structure and function of cells and explain the development of cells [K3]

**UNIT I : Algae:** General characters of algae - Structure, reproduction and life cycle of *Sargassum* and economic importance of algae. (11 Hours)

**UNIT II: Fungi:** General characters of fungi, structure, reproduction and life cycle of *Agaricus* and economic importance of fungi. (11 Hours)

### **UNIT III : Bryophytes, Pteridophytes and Gymnosperms:**

General characters of Bryophytes, Structure and life cycle of *Funaria*. General characters of Pteridophytes, Structure and life cycle of *Lycopodium*. General characters of Gymnosperms, Structure and life cycle of *Cycas*. (14 Hours)

#### **UNIT IV: Cell Biology:**

Prokaryotic and Eukaryotic cell- structure /organization. Cell organelles - ultra structure and function of chloroplast, mitochondria and nucleus. Cell division – mitosis. (12 Hours)

#### **UNIT V : Cell Biology:**

Membrane systems in Eukaryotes - Endoplasmic Reticulum, Golgi complex and Ribosomes – Origin, structure and functions. (12 Hours)

#### **TEXT BOOKS**

1. Singh, V., Pande, P.C and Jain, D.K. 2021. A Text Book of Botany. Rastogi Publications, Meerut.
2. Bhatnagar, S.P and Alok Moitra. 2020. Gymnosperms, New Age International (P) Ltd., Publishers, Bengaluru.
3. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd. Delhi.
4. Lee, R.E. 2008. Phycology, IV Edition, Cambridge University Press, New Delhi.
5. Rao, K., Krishnamurthy, K.V and Rao, G.S. 1979. Ancillary Botany, S. Viswanathan Pvt. Ltd., Madras.
6. Verma, P.S. & Agarwal, V.K. (2006). *Cell Biology*, New Delhi: S. Chand & Company Ltd.,

#### **REFERENCE BOOKS**

1. Parihar, N.S. 2012. An introduction to Embryophyta –Pteridophytes - Surjeet Publications, Delhi.
2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd.
3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi.
4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi.
5. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi.
6. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi.
7. Pandey B.P. 1986, Text Book of Botany (College Botany) Vol I &II, S.Chand and Co. New Delhi.

Course Code <b>23UBTA11</b>	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7
CO1	3	3	3	3	2	2	2
CO2	3	3	3	3	2	2	2
CO3	3	3	3	3	2	2	2
CO4	3	3	3	3	2	2	2
CO5	3	3	3	3	2	2	2

**Strong (3) Medium (2) Low (1)**

Dr. B. Karunai Selvi  
Head of the Department

Dr. B. Karunai Selvi  
Course Designer



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**VIRUDHUNAGAR - 626 001**

### B.Sc. Zoology

2023-2024 onwards

Semester II	<b>PLANT DIVERSITY AND CELL BIOLOGY PRACTICAL</b>	Hours/Week: 2	
Elective Course – I Practical I		Credits: 1	
Allied Code <b>23UBTA11P</b>		Internal 40	External 60

#### Course Outcomes:

on successful completion of the course, the learners should be able to

CO1: Explain the internal organization of algae and fungi. [K2]

CO2: Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms. [K2]

CO3: Sketch the diagrams of Plant Diversity and Cell Biology. [K3]

CO4: Interpret the structure and functions of the cell organelles [K3]

CO5: Identify the different stages of mitosis [K3]

#### EXPERIMENTS

1. Make suitable micro preparation of the types prescribed in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
2. Study of cell organelles - Chloroplast, Mitochondria, Endoplasmic reticulum and Golgi complex
3. Spotters - Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Cell biology
4. Cell division - Mitosis

#### TEXT BOOKS

1. Sharma, O.P. 2017. Bryophyta, MacMillan India Ltd, New Delhi.
2. Sharma, O.P. 2012. Pteridophyta, Tata McGraw-Hills Ltd, New Delhi.
3. De Robertis, P, Nowinski, E.D and Saez, A, (2001 reprint), *Cell Biology*, WB Saunders Co, Philadelphia.



**REFERENCE BOOKS**

1. Strickberger, M.W. 2005. Genetics (III Ed). Prentice Hall, New Delhi, India.
2. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manual to algae identification field guide, Ottawa Agriculture and Agri food Canada publisher.
3. Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual for Bryophytes and Pteridophytes. Lambert Academic Publishing.

Course Code <b>23UBTA11P</b>	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7
CO1	3	3	3	3	2	3	3
CO2	3	3	3	3	2	3	3
CO3	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3

**Strong (3) Medium (2) Low (1)**

Dr. B. Karunai Selvi  
Head of the Department

Dr.R.Sreebha  
Course Designer



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**VIRUDHUNAGAR - 626 001**

**B.Sc. Zoology**

**(2023-2024 onwards)**

Semester I	<b>ORNAMENTAL FISH FARMING &amp; MANAGEMENT</b>	Hours/Week: 2	
NME- I		Credits: 2	
Course Code <b>23UZYN11</b>		Internal 25	External 75

### Course Outcome:

The students will be able to

CO1: recall the names of commercially important ornamental fishes. [K1]

CO2: understand the culture methods of ornamental fishes. [K2]

CO3: select the advanced techniques used in aquaculture and fisheries to increase the rate of production. [K2]

CO4: develop the ability to guide layman individual in his/her difficulties during the construction as well as to run a fish farm successfully. [K3]

CO5: make use of their skills to promote self employment. [K3]

### Unit I:

Introduction to ornamental fish keeping. Scope and importance of ornamental fish culture. Domestic and global scenario of ornamental fish trade and export potential. Commercially important ornamental fishes –Gold fish, Siamese fighter fish, Black molly and angel fish .

(6 hours)

### Unit II:

**Food and feeding in ornamental fishes.** Fish feed – Brief account on Artemia and its culture. Artificial feed - Composition.) Breeding, hatchery and nursery management of egg layers (eg. Goldfish) and live bearers (eg Black molly).

(6 hours)

### Unit III:

**Aquarium design and construction;** Accessories - aerators, filters and lighting. Aquarium plants and their propagation. Maintenance of aquarium and water quality management. Ornamental fish diseases- white spot disease and Gill rot disease- prevention, control and treatment methods.

(6 hours)

**Unit IV**

Conditioning, packing, transport and quarantine methods. Economics, trade regulations, domestic and export marketing strategies. (6 hours)

**Unit- V**

- 1) Identification of locally available ornamental fishes - Egg layers and live bearers.
- 2) Identification of locally available live feed. (6 hours)

**REFERENCE BOOKS**

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

**WEBSITE REFERENCES**

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

**Mapping Table**

CO/PO Course Code 23UZYN11	PO1		PO2	PO3		PO4		PO5	PO6	PO7
CO 1	3	3	2	3	2	2	3	2	3	3
CO 2	3	3	2	2	2	3	3	.	3	3
CO 3	3	2	2	2	2	1	2	-	2	3
CO 4	3	2	1	1	3	-	2	1	2	3
CO 5	2	3	1	3	3	2	2	1	3	2

**Strong (3)    Medium (2)    Low (1)**

Dr. J. Rani  
Head of the Department

Dr. P. Vijaya  
Course Designer



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**VIRUDHUNAGAR - 626 001**

**B.Sc. Zoology**

**(2023-2024 onwards)**

Semester I	<b>FUNDAMENTALS OF ZOOLOGY</b>	Hours/Week: 2	
SEC-1 Foundation Course		Credits: 2	
Course Code <b>23UZYP11</b>		Internal 25	External 75

### Course Outcomes:

The students will be able to

CO1: recall the importance of of Zoology. [K1]

CO2: describe the techniques used in laboratory instruments. [K1]

CO3: understand the basic concepts of various branches of zoology.[K2]

CO4: discuss the preservation methods of animals. [K2]

CO5: explain and transmit their knowledge about the significance of animals to the society.

[K2]

### UNIT-I

Introduction - History and Scope of Zoology, Branches of Zoology, Applications and importance of Zoology, Career opportunities in Zoology. Contributions of Zoologists- Schleiden and Schwann, Anton van Leeuwenhoek, Carl Linnaeus, Gregor Johann Mendel, Watson and Crick, Karl Landsteiner, Charles Robert Darwin *and* Lamarck. (6 Hours)

### UNIT-II

#### Basic concepts in Zoology-Terminologies in Animal Diversity and Cytogenetics - -

Invertebrata, Chordata, Herbivore, Carnivore, Omnivore, Ectoparasite, Endoparasite, Oviparous, Viviparous, Ovoviviparous, Hermaphrodite, Sedentary Animal, Agnatha, Acrania, Apoda and Tetrapoda. Prokaryotic Cell, Eukaryotic Cell, Nucleoid, Amitosis, Mitosis, Meiosis, Osmosis, Diffusion, Plasma Membrane, Protoplasm, Karyokinesis, Cytokinesis, Allele, Gene, Genotype, Phenotype, Inheritance, Pedigree Analysis, Euthenics, Eugenics. Genome and Proteome. (6 Hours)

### UNIT-III

#### **Terminologies in Developmental biology, Animal Physiology, Ecology and Evolution-**

Digestion, respiration, excretion, reproduction, circulation, enzymes, hormones, metabolism, anabolism and catabolism. Ovum, sperm, gametes, gametogenesis, fertilization, Zygote, Cleavage, Blastula, Gastrula, Metamorphosis and Retrogressive Metamorphosis. Ecosystem, Biotic factors, Abiotic Factors, Producers, Consumers, Decomposers, Habitat, Population, Community, Xerophyte and Hydrophyte. Fossil, Extinct Species, Endangered Species, Palaeontology, Connecting Link, Homologous Structures, Analogous Structures, Vestigial Structures and Atavism. (6 Hours)

### UNIT-IV

Laboratory Instruments and Uses: Microscope - Compound and Dissection, Haemocytometer, Haemoglobinometer, Stethoscope, Sphygmomanometer, Incubator, Laminar Air Flow Chamber and Deep Freezer. (6 Hours)

### UNIT-V

Animal Collection and Preservation techniques: Collection - Beat collection, Gill net, Seine net, Trap net, Sweep net and Hand Collection. Preservation - Wet and Dry methods- Chemical and Physical method. (6 Hours)

### REFERENCES

1. A Dictionary of Zoology Michael Allaby, 2020
2. A Dictionary of Zoology- A.W.Leftwich,2004
3. Modern text book of Zoology-Kotpal, R.L.2009

### Web References

1. <https://eduinput.com/introduction-to-zoology/>
2. <https://www.scribd.com/presentation/430924605/Scope-of-Zoology#>
3. <http://importanceofstuff.com/zoology>
4. <https://ucmp.berkeley.edu/glossary/gloss7metazoa.html>
5. <https://dpmiindia.com/blog/2022/10/04/museum-technique/>:

**Mapping Table**

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	3	3	2	3	3	3	3	3	3
CO2	3	2	2	2	3	1	3	3	3	3
CO3	3	2	1	1	2	1	2	2	1	2
CO4	2	2	1	1	2	2	2	1	2	2
CO5	3	3	3	3	2	1	1	2	3	1

**Strong (3)    Medium (2)    Low (1)**

Dr. J. Rani  
Head of the Department

Dr. R. Radhalakshmi  
Course Designer



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**VIRUDHUNAGAR - 626 001**

### B.Sc. Zoology

(2023-2024 onwards)

Semester II	<b>CHORDATA</b>	Hours/Week: 5	
Core Course - 3		Credits: 5	
Course Code		Internal	External
<b>23UZYC21</b>		25	75

#### Course Outcomes:

On completion of this course, students will able to

CO1: recall the name and distinct features of different classes of phylum Chordata. [K1]

CO2: explain, the morphology and anatomical structure of vertebrates. [K2]

CO3: to apply their knowledge to identify economically important animals K2]

CO4: discuss the various modes of life in vertebrates. [K3]

CO5: to correlate the morphological and ecological adaptations in vertebrates .[K3]

#### UNIT I

**Prochordates and Chordates:** General characters, Affinities and Systematic position of Hemichordata (*Balanoglossus*), Urochordata (*Ascidia*), Cephalochordata (*Amphioxus*). Origin of Chordata, Differences between non-chordates and chordates, (15 Hours)

#### UNIT II

**Agnatha** Characteristics of subphylum vertebrata, Classification of Vertebrata upto Class level.

Agnatha (Detailed study of *Petromyzon*)

**Pisces** General characters and classification, Origin of fishes, Type study--*Scoliodon sorrakowah* Affinities of Dipnoi - Types of scales and fins - Accessory respiratory organs - Air bladder - Parental care - Migration - Economic importance. (15 Hours)

### UNIT 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. (15 Hours)

### UNIT IV

**Reptilia** : General characters and classification - Origin of reptiles- Type study – (*Calotes versicolor* (endoskeleton of *Varanus*) - Effects of terrestrialisation, Extinct reptiles. Snakes of India.-Poisonous (*Naja naja* and Viper) and Non poisonous (Ptyas and Dryophis) Poison apparatus and biting mechanism of poisonous snakes - Skull in reptiles as basis of classification. (15 Hours)

### UNIT V

**Aves and Mammalia** : Aves: General characters and classification – Type study - *Columba livia* - Origin of birds, Flight adaptations, Migration. Mammalia: General characters and classification - Type study - Rabbit - Adaptive radiation in mammals - Egg laying mammals, Marsupials, Flying mammals, Aquatic mammals, Dentition in mammals. (15 Hours)

### TEXT BOOKS

1. Ayyar, E.K. and T.N. Ananthkrishnan, (1992).Manual of Zoology Vol. II (Chordata), S. Viswanathan (Printers and Publishers) Pvt Ltd., Madras, 891p.
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.
3. Nigam, H.C., (1983). Zoology of Chordates, Vishal Publications, Jalandhar - 144008, pp.942.
4. Ganguly, Sinha,.BharatiGoswami and Adhikari, (2004).Biology of animals Vol.II - New central book Agency (p) Ltd.
5. Kotpal.R.L.A, (2009) Modern text book of Zoology Vertebrates- Rastogi publications.
- 6.

### REFERENCE BOOKS

1. Darlington P.J. (2008) The Geographical Distribution of Animals, R.E. Krieger Pub.Co.
2. Hall B.K. and Hallgrimsson B. (2008).Strickberger'sEvolution.IV Edition.Jones and Bartlett Publishers Inc.



3. Hickman, C.P. Jr., F.M.Hickman and L.S. Roberts. (1984). Integrated Principles of Zoology, 7th Edition, Times Merror/Mosby College Publication. St. Louis. 1065 pp.
4. Newman, H.H., (1981). The Phylum Chordata, Satish Book Enterprise, Agra .477 pp.
5. Parker and Haswell. (1964). Text Book of Zoology, Vol II (Chordata), A.Z.T,B.S. Publishers and Distributors, New Delhi - 110 051, 952 pp.
6. Pough H. Vertebrate life, VIII Edition, Pearson International.
7. Waterman, Allyn J. et al., (1971). Chordate Structure and Function, Mac Millan&Co., New York, 587 pp.
8. Young, J. Z. (2004). The Life of Vertebrates.IIIEdition.Oxforduniversity press.

#### WEBSITE REFERENCES

1. <http://tolweb.org/Chordata/2499>
2. <https://biologyeducare.com/aves/>
3. <https://www.vedantu.com/biology/mammalia>

#### Mapping Table

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO
	1.a	1.b	2	3.a	3.b	4.a	4.b	5	6	7
CO1	3	3	3	2	3	3	3	-	2	2
CO2	3	2	3	2	3	3	3	1	2	3
CO3	3	2	2	2	3	3	1	2	2	2
CO4	3	2	3	3	3	3	2	2	2	3
CO5	3	3	3	3	3	3	1	3	2	3

**Strong (3)    Medium (2)    Low (1)**

Dr. J. Rani  
Head of the Department

Dr. R. Radhlakshmi  
Dr. P. Veeramuthumari  
Course Designers



## V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

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**VIRUDHUNAGAR - 626 001**

### B.Sc. Zoology

(2023-2024 onwards)

Semester II	<b>CHORDATA PRACTICAL</b>	Hours/Week: 3	
Core Course – 4		Credits: 2	
Practical II			
Course Code <b>23UZYC21P</b>		Internal 40	External 60

#### Course Outcomes:

On completion of this course, students will able to

CO1: identify the animals based on distinct external features of Chordates.. [K2]

CO2: find out the structural organization of various organs and systems in different classes of vertebrates..[K2]

CO3: differentiate the morphological features and developmental stages of chordates.[K3]

CO4: dissect and examine various organs and internal systems in different vertebrates and correlate its function. [K3]

CO5: compare the morphology and ecological adaptations in vertebrates and list out the economic importance. [K3]

**Dissections:** Fish External features, Digestive system, Male and Female Urinogenital system.

**Mounting:** Fish: Placoid and Ctenoid scales. Fish - Brain (Demo).

**Osteology:** Frog: Skull and lower jaw, Vertebral column, Pectoral girdle, Pelvic girdle, Fore limb, Hind limb. Chelonia – Anapsid skull. Pigeon – Skull and lower jaw and Synsacrum.

**Specimen and Slides:** (i) **Hemichordata:** Balanoglossus, Tornaria larva (ii). **Protochordata:** UroChordata- Ascidian. Cephalochordata- Amphioxus. l(iii). **Cyclostomata:** Petromyzon, Ammocoetus larva (iv). **Pisces:** Shark, Torpedo, Hippocampus, Exocoetus, Echeneis and Protopterus. (v). **Amphibia:** Ichthyophis, Bufo, Rana, Axolotal larva (vi). **Reptilia :** Draco, Chameleon, Naja, Bungarus, Enhydrina and Typhlops. (vii) **Aves:** Archaeopteryx and Columba.

**Collection and study of different types of feathers:** Quill, Contour, Filoplume and Down (viii). **Mammalia:** Ornithorhynchus, Pteropus, Manis and Loris.

**TEXT BOOK**

1. Lal S S (2009). Practical Zoology Vertebrate, Rajpal and Sons Publishing, 484pp.
2. Verma P.S (2000). A Manual of Practical Zoology: Chordates, S.Chand Limited, 627pp.

**REFERENCE BOOKS**

1. Robert William Hegner (2015). Practical Zoology, BiblioLife, 522pp.

**Website References**

1. [https://www.youtube.com/watch?v=b04hc\\_kOY10](https://www.youtube.com/watch?v=b04hc_kOY10)
2. <http://tolweb.org/Chordata/2499>
3. <https://www.nhm.ac.uk/>

**Mapping Table**

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
23UZYC21P										
CO1	3	3	2	3	3	3	3	1	3	3
CO2	3	3	2	2	3	3	2	1	3	3
CO3	3	2	2	2	3	3	3	1	3	3
CO4	3	3	2	2	3	3	3	1	3	3
CO5	3	3	2	1	3	3	3	3	2	3

**Strong (3)    Medium (2)    Low (1)**

Dr. J. Rani  
Head of the Department

Dr. M. Tamilselvi  
Dr. R. Radhalakshmi  
Course Designers



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**VIRUDHUNAGAR - 626 001**

### B.Sc. Zoology

(2023-2024 onwards)

Semester II	<b>Taxonomy of Angiosperms and Plant Physiology</b>	Hours/Week: 4	
Elective Course - I		Credits: 3	
Allied Code <b>23UBTA21</b>		Internal 25	External 75

#### Course Outcomes:

**On completion of this course, students will able to**

CO1: Understand the fundamental concepts of plant taxonomy and physiology. [K1]

CO2: Recognize the different parts of flower and plant metabolism.[K2]

CO3: Explain the water relation of plants with respect to various physiological processes.[K2]

CO4: Demonstration of an aerobic and anaerobic respiration. [K3]

CO5: Interpret the plant systematics and recognize the importance of herbarium and virtual herbarium. [K3]

### TAXONOMY OF ANGIOSPERMS

#### UNIT I

**Morphology of flowering plants:** Plant and its parts, Structure and function of root and stem, Leaf and its parts, Leaf types - simple and compound, Phyllotaxy and types, Inflorescence - Racemose, Cymose and Special types, Herbarium preparation techniques. (12 Hours)

#### UNIT II

**Taxonomy:** Study of the range of characters and plants of economic importance in the following families: Annonaceae, Rutaceae, Caesalpinioideae and Myrtaceae. (12 Hours)

### UNIT III:

**Taxonomy:** Study of the range of characters and plants of economic importance in the following families: Asclepiadaceae, Euphorbiaceae and Cannaceae. (12 Hours)

### PLANT PHYSIOLOGY

#### UNIT III

**Plant water relation** - Absorption of water - mechanism of active and passive absorption of water. Ascent of sap – path and mechanism - Dixon’s cohesion theory. Photosynthesis – photosynthetic apparatus, pigments and units. Mechanism of photosynthesis – Light reaction: cyclic and non- cyclic photo phosphorylation and dark reaction: Calvin Cycle. (12 Hours)

#### UNIT V

**Respiration** – Aerobic and anaerobic respiration, respiratory substrates, respiratory apparatus, mechanism of respiration - glycolysis, Krebs’s cycle and electron transport chain, factors affecting respiration. Physiological role of natural growth hormones in plants: auxins, gibberellins and cytokinins and their applications. (12Hours)

### TEXT BOOKS

1. Sharma, O.P. 2017. Plant Taxonomy. (II Edition).The McGraw Hill Companies.
2. Jain, VK. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd.
3. Ting, I.P. 1982. Plant Physiology. Addison Wesley Pb. Philippines.

### REFERENCE BOOKS

1. Lawrence.G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad.
2. Salisbury, F. B.C.W. Ross.1991. Plant Physiology. Wassworth Pub. Co. Belmont.
3. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi.
4. Jain, V.K. 2006. Fundamentals of Plant Physiology, S.Chand and Company Ltd., New Delhi.
5. Verma, S.K. 2006. A Textbook of Plant Physiology, S.K.Chand & Co., New Delhi.

Course code 23UBTA21	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7
CO1	3	3	3	3	2	2	2
CO2	3	3	3	3	2	2	2
CO3	3	3	3	3	2	2	2
CO4	3	3	3	3	2	2	2
CO5	3	3	3	3	2	2	2

**Strong (3)    Medium (2)    Low (1)**

Dr. B. Karunaiselvi  
Head of the Department

Dr. B. Karunaiselvi  
Course Designer



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**VIRUDHUNAGAR - 626 001**

### B.Sc. Zoology

(2023-2024 onwards)

Semester II	<b>TAXONOMY OF ANGIOSPERMS AND PLANT PHYSIOLOGY PRACTICAL</b>	Hours/Week: 2	
Elective Course – I Practical II		Credits: 1	
Allied Code 23UBTA21P		Internal 40	External 60

#### Course Outcomes:

**On completion of this course, students will able to**

CO1: Explain the internal organization of algae and fungi. [K2]

CO2: Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms. [K2]

CO3: Solve the classical taxonomy with reference to different parameters. [K3]

CO4: Sketch the fundamental concepts of plant anatomy and embryology. [K3]

CO5: Demonstrate the effect of various physical factors on photosynthesis. [K3]

#### EXPERIMENTS

1. To describe in technical terms, plants belonging to any of the family prescribes and to identify the family
2. To dissect a flower, construct floral diagram and write floral formula.
3. Demonstration experiments
  - Mohl's half leaf experiment,
  - Ganong's Light screen
  - Ganong's respiroscope
4. Spotters – Leaf types - simple and compound, Phyllotaxy and types, Inflorescence - Racemose, Cymose and Special types, Chloroplast and Mitochondria,

#### TEXT BOOKS

1. Subramaniam, N.S. 1996. Laboratory Manual of Plant Taxonomy. Vikas Publishing House Pvt. Ltd., New Delhi.
2. Noggle G.R and G.J. Fritz. 2002. Introductory Plant Physiology. Prentice Hall of

India, New Delhi.

## REFERENCE BOOKS

1. Steward, F.C. 2012. Plant Physiology Academic Press, US
2. Gamble, J.S. 1921. Flora of the Presidency of Madras, Volumes I, II and III. Adlard and Son Ltd. London.
3. Warriar, P.K., V.P. K. Nambiar and C. Ramankutty. 1994. Indian Medicinal Plants – a compendium of 500 species. Vaidyaratnam P.S. Varier's Arya Vaidya Sala, Kottakkal, Orient Longman Publications, Chennai.

Course code 23UBTA21P	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7
CO1	3	3	3	3	2	3	3
CO2	3	3	3	3	2	3	3
CO3	3	3	3	3	2	3	3
CO4	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3

**Strong (3) Medium (2) Low (1)**

Dr. B. Karunaiselvi  
Head of the Department

Dr.R.Sreebha  
Course Designer





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**VIRUDHUNAGAR - 626 001**

### B.Sc. Zoology

(2023-2024 onwards)

Semester II	<b>BIOCOMPOSTING FOR ENTREPRENEURSHIP</b>	Hours/Week: 2	
NME-2		Credits: 2	
Course Code <b>23UZYN21</b>		Internal 25	External 75

#### Course outcomes:

The students will be able to

CO1: define the process of Biocomposting and its importance. [K1]

CO2: outline the various applications of Biocomposting. [K1]

CO3: describe about the Biocompost units. [K2]

CO4: explain the methods and requirements to construct a Biocomposting unit. [K2]

CO5: apply their skills in making “clean and green” and sustainable environment. [K3]

#### Unit I

Biocomposting – Definition, types and ecological importance. (6 Hours)

#### Unit II

Types of Biocomposting technology – Field pits/ground heaps/ tank/large-scale/batch and continuous methods. (6 Hours)

#### Unit III

Preparation of Biocompost pit and bed using different amendments. (6 Hours)

#### Unit IV

Applications of Biocompost in soil fertility maintenance, promotion of plant growth, value added products, waste reduction, etc. (6 Hours)

#### Unit V

Economics of establishment of a small biocompost unit – project report proposal for Self Help Group (Income and employment generation). (6 Hours)

**Practical**

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

**REFERENCES**

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

**Mapping Table**

CO/PO Course Code 23UZYN21	PO1		PO2	PO3		PO4		PO5	PO6	PO7
CO 1	3	2	3	3	2	3	3	3	2	3
CO 2	3	2	2	1	2	3	3	2	1	3
CO 3	3	3	2	1	2	2	1	2	1	2
CO 4	2	3	2	2	1	1	2	1	2	2
CO 5	3	2	1	2	3	3	3	2	2	1

**Strong (3)    Medium (2)    Low (1)**

Dr. J. Rani  
Head of the Department

Dr. P. Veeramuthumari  
Course Designer



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**VIRUDHUNAGAR - 626 001**

### B.Sc. Zoology

(2023-2024 onwards)

Semester II	<b>WILDLIFE CONSERVATION AND MANAGEMENT</b>	Hours/Week: 2	
SEC-2		Credits: 2	
Course Code		Internal	External
<b>23UZYS21</b>		25	75

#### Course outcomes

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

CO1: define the fundamental concepts of wild life biology. (K1)

CO2: describe the general principles of wildlife conservation to improve the status of Wildlife. (K1)

CO3: explain the problems related to wildlife conservation and management. (K2)

CO4: discuss the value of wild life species in maintaining healthy ecosystem. (K2)

CO5: identify the importance of wildlife and the conservation methods for the future. (K3)

#### Unit 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. (6 Hours)

#### Unit 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. (6 Hours)

### Unit 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. (6 Hours)

### Unit 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. (6 Hours)

### Unit 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. (6 Hours)

### TEXT BOOKS

1. Robinson W L and Eric G Bolen, 1984. Wildlife Ecology and Management, Maxmillan Publishing Company, New York, p 478.
2. Aaron, N.M. 1973 Wildlife ecology, W.H. Freeman Co. San Francisco, U.S.A.
3. Dasmann R F, 1964. Wildlife Biology, John Wiley & Sons, New York, p 231.
4. Justice Kuldip Singh 1998. Handbook of Environment, Forest and Wildlife Protection Laws in India, Natraj Publishers, Dehradun.
5. Hosetti, B.B. 1997 Concepts in Wildlife Management, Daya Publishing House, Delhi.
6. Sutherland, W.J 2000. The conservation handbook: Research, Management and Policy. Blackwell Science.
7. Caughley.G and Sinclaire, A.R.E 1994 Wildlife ecology and management. Blackwell Science.

8. Woodroffe R, Thirgood, S. and Rabinowitz A. 2005. People and Wildlife, Conflict or Coexistence? Cambridge University.
9. Sinha, P.C. 1998. Wildlife and Forest Conservation, Anmol Publishing Pvt. Ltd., New Delhi.
10. Singh, S.K, 2005. Text Book of Wildlife Management. IBDC, Lucknow

### **Suggested Readings**

1. Gilas R H Jr.(ed.), 1984. Wildlife Management Techniques, 3rd ed. The Wildlife Society, Washington D.C., Nataraj Publishers, Dehra Dun, p 547.
2. Rodgers W A, 1991. Techniques for Wildlife Census in India - A Field Manual: Technical Manual - T M - 2. WII.
3. Saharia V B, 1982. Wildlife of India, Natraj Publishers, Dehra Dun.
4. Goutam Kumar Saha and Subhendu Mazumdar, 2017. Wildlife Biology: An Indian Prospective, PHI Publisher, Delhi.
5. Katwal/Banerjee, 2002. Biodiversity conservation in managed and protected areas, Agrobios, India.
6. Gopal, Rajesh, 1992. Fundamentals of Wildlife Management, Justice Home, Allahabad, India.
7. Sharma, B.D, 1999. Indian Wildlife Resources Ecology and Development, Daya Publishing House, Delhi.
8. Stephen, H.B. and V.B. Saharia, 1995. Wildlife research and management. Asian and American Approaches, Oxford University Press, Delhi.
9. Negi, S.S. 1993. Biodiversity and its conservation in India, Indus Publishing Co., New Delhi.
10. Moulton, M. P. & J. Sanderson, 1997. Wildlife Issues in a Changing World. St. Lucie Press.

### **WEB RESOURCES**

1. <https://www.vedantu.com/biology/conservation-of-biodiversity>
2. <https://www.embibe.com/exams/conservation-of-biodiversity/>

**Mapping Table**

Course Code	PO1		PO2	PO3		PO4		PO5	PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2	PSO 3.a	PSO 3.b	PSO 4.a	PSO 4.b	PSO 5	PSO 6	PSO 7
CO1	3	2	3	3	3	2	3	2	2	3
CO2	3	2	3	2	3	1	3	2	1	3
CO3	3	3	2	1	2	1	2	2	1	3
CO4	2	2	2	1	2	1	2	3	2	2
CO5	3	2	2	2	2	2	1	2	2	2

**Strong (3)    Medium (2)    Low (1)**

Dr. J. Rani  
Head of the Department

Dr. P. Vijaya  
Course Designer