E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

(*An Autonomous Institution – Affiliated to Madurai Kamaraj University*)

Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF ZOOLOGY

CBCS With OBE

BACHELOR OF SCIENCE

PROGRAMME CODE - Z

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Annexure - 8

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re –accredited (3rd cycle) with Grade A+ and CGPA 3.51 by NAAC)

DEPARTMENT OF ZOOLOGY – UG

(w.e.f. 2022– 2023 Batch onwards)

CBCS with OBE

Vision

To achieve academic excellence through teaching, impart quality Life Science education and promote discovery and learning at all levels of biological organization.

Mission

- To bring an awareness on nature and biodiversity
- To set up a sound and peaceful environment and life to community and society
- To develop Research aptitude among students
- To develop the attitude of the students to concentrate on applied science

Programme Educational Objectives (PEOs):B.Sc. Zoology

Sl.No.	Programme Educational Objective
PEO1	To make the students understand the needs of Zoology in shaping our planet
PEO2	To acquire knowledge from diverse fields of Zoology
PEO3	To inculcate biodiversity conservation and love for nature.
PEO4	To conduct field studies and different projects of local and global interest
PEO5	To provide opportunities for professional and self development through Curricular and Co-curricular activities
PEO6	In order to develop students become entrepreneurs in subjects like Sericulture, Apiculture, and Aquaculture have been introduced. In addition Consultancy and Extension activities are also included.

Annexure - 8

Programme Outcomes for Science Graduates:

On completion of B.Sc., Programmes students will be able to

SL.No.	Programme Outcomes
PO1	Develop necessary foundation in fundamentals, aptitude, applications of sciences and other related subjects. Able to clear competitive examinations, appear with confidence and possess basic skills on the related subjects. Secure jobs in employment in Government / Private / Industry and entrepreneurship.
PO2	Receive basic experimental skills in the observation and study of nature, biological techniques, and scientific research and demonstrate proficiency in critical analysis or creativity and provide scientific solutions to the problems of the society.
PO3	Enhance the digital knowledge of statistics and to understand its application in interpreting the obtained data.
PO4	Obtain knowledge with emerging trends in their disciplinary and inter-disciplinary areas. Usage of modern tools and software can also be put to use.
PO5	Lead lifelong learning & contribute sustainability to environment, equip students enough to take up higher studies upto research in various disciplines to become professionals.
PO6	Imbibe democratic, ethical, moral, social & spiritual values in the minds of the learners to become responsible citizens and build a healthy nation.

Annexure - 8

Programme Specific Outcomes (PSOs):

PSOs	Graduate Attributes	After completion of B.Sc Zoology the students will be able to	PO Addressed
PSO-1	Knowledge& Proficiency	Establish a broad understanding of animal diversity and its relationship between structure and function of plants and animals. (Eg. molecules, cells, organs, populations and species) at different levels. To enhance the ability and personal skills of the students making them aware of industry standard skills that help them in securing jobs.	PO1
PSO-2	Problem analysis	Analysis of problems to reach substantiated conclusions by using the principles of biological sciences through research based knowledge.	PO2
PSO-3	Problem Solving	Designing of solution for complex problems pertaining to public health and safety, cultural and societal environment. Problem solving skills that are Chemistry related and that belongs to disciplinary areas.	PO2
PSO-4	Modern tool usage	Acquire needed skills, appropriate techniques, resources and modern tools to complex activities in Biological and Chemical Sciences.	PO4
PSO-5	Social responsibility	Establish health consciousness on host parasite relationship and to identify the techniques by applying the procured skills in Cell Biology , Genetics, Food Processing/Spoilage, Microbiology, Immunology, rDNA technology and Diary science. To ensure a balance between economic growth, environmental care and social wellbeing through Vermitechnology.	PO6
PSO-6	Lifelong learning	Promote Students employability for a carrier in Zoology, Chemistry, and Botany in particular and other relevant post graduate studies.Aids the students to work in pharma industry, chemical Industry and R&D Laboratories.	PO5
PSO-7	Ethical& Moral and Spiritual Values	Appreciation of spiritual and moral values informs the life of the truly educated person.	PO6
PSO-8	Leadership, Team work & Communication	Acquire training, Internships and team spirit through academic projects.	PO3

Annexure - 8

Qualification for Admission

Candidates should have passed the Higher Secondary Examination with Pure Science/ Biology as one of the stream, conducted by the Board of Higher Education, Government of Tamilnadu, CBSC & ICSE or any other examination approved by Madurai Kamaraj University as equivalent.

Duration of the Course

The students shall undergo this prescribed course of study for the period of three academic years under Choice Based Credit System (CBCS) semester pattern with Outcome Based Education (OBE).

Medium of Instruction: English

System: Choice Based Credit System with Outcome Based Education Model

Courses of Study with Credit Distribution for B.Sc Zoology

Category	No.of Courses	No.of Credits
Part-I	4	12
Part –II	4	12
Major Core Papers	11	47
Discipline Specific Elective Courses	3	12
Generic Elective Courses (Chemistry & Botany)	12	18+18
Skill Enhancement Courses	6	12
Inter Disciplinary Courses	2	4
Ability Enhancement Compulsory Courses	2	4
NSS/Physical Education	1	1
Total	45	140

Nature of the Course

Courses are classified according to the following nature

1. Knowledge and skill oriented 2. Employability oriented 3. Entrepreneurship oriented

Outcome Based Education (OBE) & Assessment: Students understanding must be built on and assessed for wide range of learning activities, which includes differentapproaches and are classified along several basis, such as

1. **Based on purpose:**
   - Continuous Assessment (internal tests, Assignment, seminar, quiz, Documentation, Case lets,ICT based Assignment, Mini projects administered during the learning process)
   - External Assessment (Evaluation of students' learning at the end of instructional unit)
2. **Based on Domain Knowledge: (for UG Upto K4 levels)**
   Assessment through K1, K2, K3 & K4

Annexure - 8

EVALUATION (THEORY)
(PART I / PART II / PART III)

Internal (Formative) : 25 marks
External (Summative) : 75 marks
Total :100 marks

Formative Test (CIA-Continuous Internal Assessment) : 25 Marks

Components	**Marks**
Test (Average of three tests) (Conducted for 100 marks and converted into 20 marks)	**20**
Assignment(Quiz/ Documentation/ Case lets/ ICT based Assignment/ Mini Projects)	**5**
Total	**25**

- ✓ **Centralized system** of Internal Assessment Tests
- ✓ There will be **Three Internal Assessment** Tests
- ✓ Duration of Internal assessment test will be **1 hour for Test I and 2 hours for Test II and III** respectively.
- ✓ Students shall write **retest** with the approval of HOD on genuine grounds if they are absent.

Question Paper Pattern for Continuous Internal Assessment- Test I

Section		**Marks**
A-Multiple Choice Question	(3x1 mark)	3
B-Short Answer	(1x2 marks)	2
C-Either Or type	(1/2x 5 marks)	5
D-Open choice type	(1/3 x 10 marks)	10
Total		20

Question Paper Pattern for Continuous Internal Assessment -Test II and III

Multiple choice for Section		**Marks**
A- Multiple Choice Question	(6x1 mark)	6
B-Short Answer	(2x2 marks)	4
C-Either Or Type	(2/4 x5 marks)	10
D-Open Choice Type	(2/3 x 10 marks)	20
Total		40

Conducted for 100 marks and converted into 20 marks

Annexure - 8

Question Paper Pattern for Summative Examination

Section	Marks
A- Multiple choice Questions without Choice (10x1 mark)	10
B-Short Answer without choice (5x2 marks)	10
C-Either Or type (5/10 x5 marks)	25
D-Open Choice type (3/5x10 marks)	30
Total	75

In respect of Summative Examinations passing minimum is **36% for UG.**

Distribution of Marks in % with K Levels CIA I, II, III & External Assessment

Bloom's Taxonomy	Internal Assessment			External Assessment
	I	II	III	
Knowledge (K1)	12%	12%	12%	13%
Understanding (K2)	44%	22%	22%	21%
Apply (K3)	44%	33%	33%	33%
Analyze (K4)	-	33%	33%	33%

Latest amendments and revision as per **UGC** and **TANSCHE** norms is taken into consideration in curriculum preparation.

Annexure - 8

BLUE PRINT FOR INTERNAL ASSESSMENT – I

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Upto K3	3	(K1)	1	K1	2 (K2) (Each set of questions must be in same level)	1 (K2) & 2 (K3)	
No. of Questions to be asked			3		1		2	3	9
No. of Questions to be answered			3		1		1	1	6
Marks for each question			1		2		5	10	-
Total Marks for each section			3		2		5	10	20

BLUE PRINT FOR INTERNAL ASSESSMENT – II

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 2	Upto K3	3	(K1/ K2)	1	(K1/ K2)	2 (K2) / 2 (K4) (Each set of questions must be in same level)	2 (K3) & 1 (K4)	
2	CLO 3	Upto K4	3	(K1/ K2)	1	(K1/ K2)			
No. of Questions to be asked			6		2		4	3	15
No. of Questions to be answered			6		2		2	2	12
Marks for each question			1		2		5	10	-
Total Marks for each section			6		4		10	20	40

Annexure - 8

BLUE PRINT FOR INTERNAL ASSESSMENT – III

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 4	Up to K3	3	(K1/ K2)	1	(K1/ K2)	2 (K2) / 2 (K4) (Each set of questions must be in same level)	2 (K3) & 1 (K4)	
2	CLO 5	Up to K4	3	(K1/ K2)	1	(K1/ K2)			
No. of Questions to be asked			6		2		4	3	15
No. of Questions to be answered			6		2		2	2	12
Marks for each question			1		2		5	10	-
Total Marks for each section			6		4		10	20	40

Distribution of Marks with K Levels CIA I, CIA II and CIA III

CIA	K Levels	Section -A MCQ (No choice)	Section -B Short Answer (No choice)	Section -C (Either or Type)	Section –D (Open choice)	Total Marks	% of Marks
I	K1	3	2	-	-	5	12
	K2	-	-	10	10	20	44
	K3	-	-	-	20	20	44
	K4	-	-	-	-	-	-
	Marks	**3**	**2**	**10**	**30**	**45**	**100**
II	K1	5	2	-	-	7	12
	K2	1	2	10	-	13	22
	K3	-	-	-	20	20	33
	K4	-	-	10	10	20	33
	Marks	**6**	**4**	**20**	**30**	**60**	**100**
III	K1	5	2	-	-	7	12
	K2	1	2	10	-	13	22
	K3	-	-	-	20	20	33
	K4	-	-	10	10	20	33
	Marks	**6**	**4**	**20**	**30**	**60**	**100**

Annexure - 8

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K-Level	Section A		Section B		Section C (Either/or Type)	Section D (open choice)	Total
			MCQs (No choice)		Short Answers (No choice)				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Upto K3	2	K1/K2	1	K1/K2	2 (K3 & K3)	1(K2)	
2	CLO 2	Upto K3	2	K1/K2	1	K1/K2	2(K2 & K2)	1(K3)	
3	CLO 3	Upto K4	2	K1/K2	1	K1/K2	2 (K4 & K4)	1(K4)	
4	CLO 4	Upto K 3	2	K1/K2	1	K1/K2	2 (K3 & K3)	1(K3)	
5	CLO 5	Upto K 4	2	K1/K2	1	K1/K2	2 (K4 & K4)	1(K4)	
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	9	6	-	--	**15**	13
K2	1	4	10	10	**25**	21
K3	-	-	20	20	**40**	33
K4	-	-	20	20	**40**	33
Total Marks	10	10	50	50	**120**	100

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3- Application oriented- Solving Problems, Justifying the statement and deriving inferences
K4- Examining, analyzing, presentation and make inferences with evidences

Annexure - 8

EVALUATION (THEORY)

(PART IV - SEC, IDC, AECC (EVS & Value Education)

PART V - NSS / Physical Education)

Internal (Formative) : 25 marks

External (Summative) : 75 marks

Total : 100 marks

Formative Test (CIA-Continuous Internal Assessment) : 25 Marks

Components	Marks
Test (Conducted for 50 marks and converted into 25 marks)	**25**

- ✓ There will be Only one Internal Assessment Test
- ✓ Duration of Internal assessment test will be 2 hour for Test

Students shall write retest with the approval of HOD on genuine grounds if they are absent.

Question Paper Pattern for Continuous Internal Assessment Test

Section	Marks
A-Multiple Choice Question (5x1 mark)	5
B-Short Answer (5x2 marks)	10
C-Either Or type (3/6 x 5 marks)	15
D-Open choice type (2/3 x 10 marks)	20
Total	50

Conducted for 50 marks and converted into 25 marks

Question Paper Pattern for External Examination

Section	Marks
A-Multiple Choice Question (10x1 mark)	10
B-Short Answer (5x2 marks)	10
C-Either Or type (5/5 x 5 marks)	25
D-Open choice type (3/5 x 10 marks)	30
Total	75

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BLUE PRINT FOR INTERNAL ASSESSMENT

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1.	CLO1	Upto K3	1	K1	1	K1	4(K2) & 2(K3) (Each set of questions must be in same level)	1(K2) & 2(K3)	
2.	CLO2	Upto K3	1		1				
3.	CLO3	Upto K3	1		1				
4	CLO4	Upto K3	1		1				
5	CLO5	Upto K3	1		1				
No. of Questions to be asked			5		5		6	3	19
No. of Questions to be answered			5		5		3	2	15
Marks for each question			1		2		5	10	
Total Marks for each section			**5**		**10**		**15**	**20**	**50**

Distribution of Marks with K Levels - CIA

CIA	K Levels	Section A MCQ	Section B (Short Answers)	Section C (Either Or Type)	Section D (Open Choice)	Total Marks	% of Marks
I	K1	5	10	-	-	15	20
	K2	-	-	20	10	30	40
	K3	-	-	10	20	30	40
	K4	-	-	-	-	-	-
	Marks	**5**	**10**	**30**	**30**	**75**	**100**

.

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Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K-Level	Section A		Section B		Section C (Either or Type)	Section D (Open Choice)	Total
			MCQs		Short Answers				
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Upto K3	2	K1	1	K1	6(K2) & 4(K3) (Each set of questions must be in same level)	2(K2) & 3(K3)	
2	CLO 2	Upto K3	2		1				
3	CLO 3	Upto K3	2		1				
4	CLO 4	Upto K 3	2		1				
5	CLO 5	Upto K 3	2		1				
No. of Questions to be asked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ's)	Section B (Short Answer)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	10	10	-	--	**20**	16
K2	-	-	30	20	**50**	42
K3	-	-	20	30	**50**	42
Total Marks	10	10	50	50	**120**	100

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E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

(An Autonomous Institution – Affiliated to Madurai Kamaraj University)
(Re –accredited (3rd cycle) with Grade A+ and CGPA 3.51 by NAAC)

DEPARTMENT OF ZOOLOGY – UG

(with Allied Chemistry and Allied Botany)

CBCS with OBE

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Semester	Part	Course Code	Title of the Course	Teaching hrs (per week)	Duration of Exam (hrs.)	Marks Allotted			Credits
						CIA	SE	Total	
I	I	**22OU1TA1**	Tamil	6	3	25	75	100	3
	II	**22OU2EN1**	English	6	3	25	75	100	3
	III	**22OUZO11**	**Core –** Invertebrata	4	3	25	75	100	4
	III		**Core - Lab** in Invertebrata & Chordata	2	-	-	-	-	-
	III	**22OUZOGECH1**	**GEC–** Chemistry -I Inorganic, Organic & Physical Chemistry	4	3	25	75	100	4
	III		**GEC-** Practical-1 Salt analysis	2	-	-	-	-	-
	IV	**22OUZOSE11**	**SEC-** Computer Application	2	3	25	75	100	2
	IV	**22OUZOSE12**	**SEC-** Dairy Science	2	3	25	75	100	2
	IV	**22OUZOID1**	**IDC –** Applied Zoology	2	3	25	75	100	2
II	I	**22OU1TA2**	Tamil	6	3	25	75	100	3
	II	**22OU2EN2**	English	6	3	25	75	100	3
	III	**22OUZO21**	**Core –** Chordata	4	3	25	75	100	4
	III	**22OUZO2P**	**Core- Lab** in Invertebrata & Chordata	2	3	40	60	100	2
	III	**22OUZOGECH2**	**GEC–** Chemistry –II Organic, Applied & Analytical Chemistry	4	3	25	75	100	4
	III	**22OUZOGECH2P**	**GEC-** Practical-1 Salt analysis	2	3	40	60	100	1
	IV	**22OUZOSE21**	**SE**C -Vermitechnology	2	3	25	75	100	2
	IV	**22OUZOSE22**	**SEC** - Aqua Culture	2	3	25	75	100	2
	IV	**22OUZOID2**	**IDC** - Ornamental Fish Culture	2	3	25	75	100	2
	I	**22OU1TA3**	Tamil	6	3	25	75	100	3
	II	**22OU2EN3**	English	6	3	25	75	100	3
	III	**22OUZO31**	**Core –** Cell and Molecular Biology	4	3	25	75	100	4

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III	III		**Core - Lab** in Cell and Molecular Biology and Developmental Biology	2	-	-	-	-	-
	III	**22OUZOGECH3**	**GEC–** Chemistry -III Industrial Chemistry	4	3	25	75	100	4
	III		**GEC-** Practical- II Volumetric Analysis	2	-	-	-	-	-
	III	**22OUZOGEBO3**	**GEC: Botany –I** Plant Diversity- I	4	3	25	75	100	4
	III		GEC : **Botany Practical – I** Plant Diversity- I & Basics of Botany	2	-	-	-	-	-
IV	I	**22OU1TA4**	Tamil	6	3	25	75	100	3
	II	**22OU2EN4**	English	6	3	25	75	100	3
	III	**22OUZO41**	**Core** – Developmental Biology	4	3	25	75	100	4
	III	**22OUZO4P**	**Core - Lab** in Cell and Molecular Biology and Developmental Biology	2	3	40	60	100	2
	III	**22OUZOGECH4**	**GEC–** Chemistry –IV Medicinal, Green & Nano Chemistry	4	3	25	75	100	4
	III	**22OUZOGECH4P**	**GEC-** Practical -II Volumetric Analysis	2	3	40	60	100	1
	III	**22OUZOGEBO4**	**GEC: Botany –II** Basics of Botany	4	3	25	75	100	4
	III	**22OUZOGEBO4P**	**GEC: Botany Practical – I** Plant Diversity- I & Basics of Botany	2	3	40	60	100	1
V	III	**22OUZO51**	**Core –** Genetics	4	3	25	75	100	4
	III		**DSEC - I**	4	3	25	75	100	4
	III		**DSEC - II**	4	3	25	75	100	4
	III		**Core - Lab** in Genetics, Ecology & Evolution and Biochemistry.	4	-	-	-	-	-
	III		**Core - Lab** in Physiology Microbiology & Immunology and Biotechnology	4	-	-	-	-	-
	III	**22OUZOGEBO5**	**GEC: Botany – III** Taxonomy of Angiosperms	4	3	25	75	100	4
	III		**GEC: Botany Practical – II** Taxonomy of Angiosperms & Applied Botany	2	-	-	-	-	-
	IV	**22OUZOSE5**	**SEC-**Biostatistics	2	3	25	75	100	2
	IV	**22OUAECEV5**	**AECC** - Environmental Studies	2	3	25	75	100	2
VI	III	**22OUZO61**	**Core -**Physiology	4	3	25	75	100	4
	III	**22OUZO62**	**Core -** Microbiology & Immunology	4	3	25	75	100	4
	III		**DSEC – III**	4	3	25	75	100	4

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	III	**22OUZO61P**	**Core - Lab** in Genetics, Ecology & Evolution and Biochemistry.	4	3	40	60	100	7
	III	**22OUZO62P**	**Core -Lab** in Physiology, Microbiology & Immunology and Biotechnology	4	3	40	60	100	8
	III	**22OUZOGEBO6**	**GEC: Botany –IV** Applied Botany	4	3	25	75	100	4
	III	**22OUZOGEBO6P**	**GEC: Botany Practical – II** Taxonomy of Angiosperms & Applied Botany	2	3	40	60	100	1
	IV	**22OUZOSE6**	**SEC -** Economic Zoology	2	3	25	70	100	2
	IV	**22OUAECVE6**	**AECC-**Value Education	2	2	25	75	100	2
	V	**22OU5NS4/ 22OU5PE4**	**Extension Activities** NSS/Physical Education	-	2	-	-	100	1
			Total						140

GEC : Generic Elective Course
SEC : Skill Enhancement Course
DSEC : Discipline Specific Elective Course
AECC: Ability Enhancement Compulsory Course
IDC : Inter Disciplinary Course

DSEC: Discipline Specific Elective Course:

Semester - V (DSEC– I & II – Choose any two)

1. **Ecology & Evolution - 22ODSEZ5A**
2. **Biochemistry - 22ODSEZ5B**
3. Fisheries Biology - 22ODSEZ5C

Semester- VI (DSEC - III - Choose any one)

1. **Biotechnology - 22ODSEZ6A**
2. Poultry science - 22ODSEZ6B

NOTE:

The students are permitted to obtain additional credits (Optional)

1. MOOCs / SWAYAM / NPTEL Courses (Online)
2. Project

Year	Semester	Title	Duration of Study	Credit
III	VI	Project title	6 months	1

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Compulsory Courses:

Year	Semester	Nature of Course	Course code	Title of the Course	Hours	Offered to
I	I	Add on Course	22ZOAOC 22ZOAOCP	Entrepreneurial bee keeping Lab in Entrepreneurial bee keeping	30	I B.Sc., Zoology
II	III & IV	Certificate Course	22ZOC 22ZOCP 22BOC 22BOCP	1.Human Systems & Clinical Chemistry Lab in Human Systems & Clinical Chemistry 2.Horticulture -Propagation of horticulture crops Lab in Methods of propagation techniques	90 90	II year students of all other disciplines II year students of all other disciplines
III	V	Value Added Course	22ZOVAC 22ZOVACP	Fundamendals of Medical Coding (FOMeC) Lab in Fundamendals of Medical Coding (FOMeC)	30	III B.Sc., Zoology

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Department of Zoology					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
I	Core	22OUZO11	Invertebrata	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✔		

Course Objectives:

1. To enable the students to understand the level of organization in invertebrate classifications.
2. To identify the animals and recognize their key characters of all phyla.
3. To help the students gain practical applications in the field of research.
4. To make the learners aware of the human misconceptions, bioethics and phobias associated with invertebrate interactions.
5. To create awareness on the role of Invertebrates in biological communities, ecological interactions.

Course Content:

Unit – I Binomial Nomenclature – Rules of Nomenclature, outline classification of invertebrates. **Phylum Protozoa:** Classification upto class level and their characters with an Indian example - *Trypanosoma gambiense.* Structural organization of *Paramecium caudatum* - Digestive system. **General Topic:** Locomotion in Protozoa. **Phylum Porifera:** Classification upto class level and their characters with an Indian example – Hyalonema. Structural organization of *Leucosolenia*- Reproductive system. **General Topic:** Canal system of sponges. **Unit – II Phylum Coelenterata:** Classification upto class level and their characters with an Indian example – Hydra. Structural organization of *Obelia* – Reproductive system. **General Topic:** Coral, Coral reefs formation and Conservation.

Unit – III Phylum Helminthes: Classification upto class level and their characteristics with an Indian example - *Taenia solium.* Structural organization of *Fasciola hepatica* – Excretory system in Liver fluke. **General Topic:** Parasitic adaptations in Platyhelminthes. **Phylum Annelida:** Classification upto class level and their characteristics with an Indian example-

Chaetopterus. Structural organization of *Megascolox mauritii* –Excretory system. **General Topic:** Metamerism in Annelida.

Unit – IV Phylum Arthropoda: Classification upto class level and their distinguishing characters with an Indian example – Scorpion. Structural organization of freshwater Prawn – Excretary system. **General topic:** Parasitic Adaptations of Crustaceans and their significance.

Unit – V Phylum Mollusca: Classification upto class level and their distinguishing characters with an Indian example – Chiton. Structural organization of *Pila globosa* – Digestive system. **General Topic:** Cephalopods are advanced Molluscs. Phylum **Echinodermata:** Classification upto class level and their distinguishing characters with an Indian example - Sea cucumber. Structural organization of *Asterias rubens* – Water vascular system. **General Topic**: Larval forms and their significance.

Books for Study:

1. Nair N.C, Leelavathy.S, Soundara Pandian.N Murugan.T and Arumugam.N.(2010) *A text book of Invertebrata*, Saras publication.
2. Kotpal. R.L.*Modern.*, (2005) *Text Book of Zoology Invertebrates*, 9th Edition. Rastogi publication, Meerut.

Books for Reference:

1. Barrington, E. J. W.,(1979) *Invertebrate Structure and functions*, II Edition, E.L.B.S, East-West Press Pvt. Ltd, New Delhi.
2. Hyman L.H.,(1982) *The Invertebrates*, Vol. I-VI, McGraw-Hill Companies Inc, New York.
3. M.Ekambaranatha Ayyar & T. N. Ananthakrishnan., (2012) *A Manual of Zoology*, S. Viswanathan Pvt. Limited.
4. Jordon E.L. and Verma P.S.,(2014) *Invertebrate Zoology*, S. Chand & Company Ltd., New Delhi, India.

Web Resources / E.Books:

https://basicbiology.net/animal/mammals

https://www.nwf.org/Educational-Resources/Wildlife-Guide/invertebrates

https://study.com/academy/lesson/animal-behavior-innate-vs-learned.html

https://fliphtml5.com/zrrga/rxxh/basic

Pedagogy:

Chalk and Talk, PPT, Group discussion, OHP presentations, Quiz, On the spot test, You tube Links, Open book test and Virtual Labs.

Annexure - 8

Rationale for nature of Course:

Knowledge and Skill: To make students aware of the role of Invertebrates in biological communities and understand their significance and ecological interactions.

Activities to be given: Students shall be asked to collect invertebrate specimens and make documentation as a group activity.

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CLO1	Understand the basic level of organization and taxonomy of animal kingdom	K1 to K3
CLO2	Identify the general characters and describe the outline classification from protozoa to Echinodermata.	K1 to K3
CLO3	Apply the knowledge to identify the unique characters of each phyla.	K1 to K4
CLO4	Analyze the significance of animal existence and adaptation in their habitat.	K1 to K3
CLO5	Examine the role of invertebrates in the ecosystem and their interactions.	K1 to K4

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	1	2	3	2
CLO2	3	1	1	1	3	2
CLO3	3	1	1	1	3	2
CLO4	3	1	2	3	3	2
CLO5	3	2	1	2	2	3

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN: TOTAL HOURS (60Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**Binomial Nomenclature** – Rules of Nomenclature, outline classification of invertebrates. **Phylum Protozoa:** Classification upto class level and their characters with an Indian example - *Trypanosoma gambiense.* Structural organization of *Paramecium caudatum* - Digestive system.. **General Topic:** Locomotion in Protozoa. **Phylum Porifera:** Classification upto class level and their characters with an Indian example – Hyalonema.Structural organization of *Leucosolenia*- Reproductive system. **General Topic:** Canal system of sponges.	12	Chalk and Talk, PPT, quiz, on the spot test
II	**Phylum Coelenterata:** Classification upto class level and their characters with an Indian example – Hydra. Structural organization of *Obelia* – Reproductive system. **General Topic:** Coral, Coral reefs formation and Conservation.	9	Chalk and Talk, OHP quiz, on the spot test
III	**Phylum Helminthes:** Classification upto class level and their characteristics with an Indian example - *Taenia solium.* Structural organization of *Fasciola hepatica* – Excretary system in Liver fluke. **General Topic:** Parasitic adaptations in Platyhelminthes. **Phylum Annelida:** Classification upto class level and their characteristics with an Indian example- Chaetopterus. Structural organization of *Megascolox mauritii* –Excretory system. **General Topic:** Metamerism in Annelida.	15	Chalk and Talk, PPT, group discussion , OHP and You tube Links
IV	**Phylum Arthropoda**: Classification upto class level and their distinguishing characters with an Indian example – Scorpion. Structural organization of freshwater Prawn – Excretary system. **General topic:** Parasitic Adaptations of Crustaceans and their significance.	9	Chalk and Talk, OHP,PPT presentations, quiz,
V	**Phylum Mollusca**: Classification upto class level and their distinguishing characters with an Indian example – Chiton. Structural organization of *Pila globosa* – Digestive system. **General Topic:** Cephalopods are advanced Molluscs. Phylum **Echinodermata:** Classification upto class level and their distinguishing characters with an Indian example - Sea cucumber. Structural organization of *Asterias rubens* – Water vascular system. **General Topic**: Larval forms and their significance.	15	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, open book test

Course Designer:
Dr.(Mrs).G.Indira Rani

Annexure - 8

Department of Zoology					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
I	Skill Enhancement Course	22OUZOSE11	Computer Application	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	Entrepreneurship oriented
✔	✔	

Course Objectives

1. Insight the student's knowledge with basics of computer system.
2. Equip the students to access the usage of MS word.
3. Gain knowledge of working with Excel, PowerPoint.
4. Make students to recognize for accessing the usage of Internet.
5. Take up self employment in all Computer applied fields.

Course content:

Unit – I Introduction to PC and Operating System - Computer, Components of Computer System- Central Processing Unit (CPU), Other input/output Devices, Computer Memory, Hardware and Software. Operating System- Basics of Popular Operating Systems, The User Interface, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts.

Unit – II Understanding MS Word Processing -Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.

Unit – III Using MS Excel -Basics of Spreadsheet; Manipulation of cells; performing basics Statistics using spreadsheet applications, creating basic graphs, Editing of Spread Sheet, printing of Spread Sheet.

Unit – IV Making MS Powerpoint Presentation - Basics of presentation software; Preparation and Presentation of Slides; Slide Show; Taking printouts of presentation / handouts.

Unit – V Introduction to Internet, WWW and Web Browsers- Basic of Computer networks- LAN, WAN, Concept of Internet, Applications of Internet; World Wide Web; Web Browsing software- Search Engines; Understanding URL; Domain name; IP Address.

Books for Study:

1. Sundaralingam R, Arumugam N, Kumaresan V, Gopi A and Meena A, (2010) *Bio Statistics, Computer Application and Bioinformatics*, Saras Publication, Nagercoil, Tamilnadu.
2. Anita Goel.,(2010) *Computer Fundamentals*, Pearson, 1st edition.

Reference Books:

1. T.C. Bartee., (1991)*Digital Computer Fundamentals*, 6thEdition, Tata McGraw Hill, NewDelhi.
2. P. K. Sinha & Priti Sinha.(2007) *Computer Fundamentals*, BPB Publications.
3. Rajaraman V and Neeharika Adabala. (2017) *Fundamentals of Computers*, 6th Edition, from BBT books, New Delhi.

Web Resources/ E.Books:

https://nios.ac.in/media/documents/vocational/CLS/Certificate_Course_in_Library_Science_english/M4_PDF/M4L1.pdf

http://www.mcrhrdi.gov.in/93fc/material/Computer%20Fundamentals%20&%20Office%20Applications.pdf

file:///C:/Users/Pc/Desktop/computer-fundamentals-pradeep-k-sinha-priti-sinha-computer-fundamentals-e39609301.html

Pedagogy:

Chalk and Talk, PPT, group discussion, quiz, on the spot test and Virtual Labs.

Rationale for nature of Course:

Knowledge and Skill: Able to use computer tools relevant to the job allows the students to work on more challenging projects and helps them get a job faster than candidates who lack these skills.

Employability Oriented: Take up self-employment in all Computer applied fields.

Activities to be given:

To operate MS word document, prepare and present a PPT.

To apply the knowledge of MS Excel to create and notify a spreadsheet.

Annexure - 8

Course learning Outcomes (CLOs):

CLO	Course OutcomesStatement	Knowledge According to Bloom's Taxonomy (Upto k Levels)
CLO1	Understand the basic concepts of Computer and operating system.	K1 to K3
CLO2	Identify the usage of MS office	K1 to K3
CLO3	Apply the knowledge of MS Excel to create a spreadsheet and to manipulate it	K1 to K3
CLO4	Analyze the significance of preparing and presenting a PPT.	K1 to K3
CLO5	Apply usage of Internet, Search Engines and Web Browsing tools in day today life.	K1 to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	1	2	3	2
CLO2	3	3	2	3	3	2
CLO3	3	3	1	2	2	1
CLO4	3	2	2	1	1	2
CLO5	3	3	1	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN : Total Hours (30Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**Introduction to PC and Operating System :** Computer, Components of Computer System- Central Processing Unit (CPU), Other input/output Devices, Computer Memory, Hardware and Software. Operating System- Basics of Popular Operating Systems, The User Interface, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts.	5	PPT, virtual lab
II	**Understanding MS Word Processing** -Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.	6	Chalk and Talk, PPT, On the spot test .
III	**Using MS Excel** -Basics of Spreadsheet; Manipulation of cells; performing basics Statistics using spreadsheet applications, creating basic graphs, Editing of Spread Sheet, printing of Spread Sheet.	6	Chalk and Talk, PPT, On the spot test .
IV	**Making MS Powerpoint Presentation** Basics of presentation software; Preparation and Presentation of Slides; Slide Show; Taking printouts of presentation / handouts.	6	Chalk and Talk, PPT, On the spot test .
V	**Introduction to Internet, WWW and Web Browsers-** Basic of Computer networks- LAN, WAN, Concept of Internet, Applications of Internet; World Wide Web; Web Browsing software- Search Engines; Understanding URL; Domain name; IP Address.	7	Chalk and Talk, PPT,Lap top teaching

Course Designer:
Dr.(Mrs).M.A.Soniya

Annexure - 8

Department of Zoology					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
I	Skill Enhancement Course	22OUZOSE12	Dairy Science	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	**Entrepreneurship oriented**
	✔	✔

Course Objectives

1. Acquire knowledge on the different breeds of cattle and their characteristics
2. Make them aware of the factors affecting health and livestock diseases.
3. Learn about nutritional recommendations for lactating mother and breeding management.
4. Acquire the skills to manage a dairy farm or to start one with adequate inputs.
5. Know how on the novel techniques of cattle breeding.

Course content:

Unit I Dairy Farming-Definition, Scope, Dairy breeds of cattle in India and its classification. Exotic cow breed- Jersey and Red Sindhi. Buffalo-Murrah and Surti. Goat –Jamunapari and Malapuri.

Unit II Common cattle feed and their nutritive values. Rations - its computational and qualities-Balanced ration. Anatomy and physiology of mammary glands. Milk secretion and importance of Colostrum.

Unit III Milk composition-Nutritive value. Pasteurization of milk – spoilage of milk. Milk products -Butter, Cream, Khoa and Ghee. Adulteration of milk -6 Hrs.

Unit IV Viral diseases-Cow pox-Foot and mouth disease-Rinder pest. Bacterial diseases – Anthrax- Mastitis- Tuberculosis- Haemorrhagic septicemia. Non-contagious diseases-Milk fever, Parasites of dairy breeds.

Unit V Role of Co-operative societies in milk production and marketing. Techniques adopted in cattle breeding – inbreeding, Outbreeding and Artificial insemination. Merits and demerits of Dairy Business.

Books for Study:

1. Arumugam N, Murugan T, Johnson Rajeswar J and Ram Prabu R, (2015) Applied Zoology, Saras Publication, Kanyakumari.
2. Uma Shankar Singh, (2008) *Dairy Farming*. Anmol Publications, New Delhi.

Reference Books:

1. Edgar Spreer. (1998) Milk and Dairy Products Technology, ISBN 9780824700942, Published January 7, by CRC Press, 498 Pages.
2. Leitch, A. (2018) *The Dairy Farm: Dairy Cattle Methods, and Dairy Farm Management*, Forgotten Books.

Web Resources/ E.Books:

https://agritech.tnau.ac.in/farm_enterprises/Farm%20enterprises_%20Dairy%20unit.html

https://jkanimalhusbandry.net/wp-content/uploads/2019/02/guidelines-dairy-farm.pdf

https://www.nddb.coop/sites/default/files/handbook_of_good_dairy_husbandry_practices_low.pdf

Pedagogy:

Chalk and Talk, PPT, group discussion, OHP presentations, quiz, on the spot test and Virtual Labs.

Rationale for nature of Course:

Employability Oriented: Completion of the programme may seek employment in private dairy farm, milk processing plants and dairy product factories.

Entrepreneurship oriented: After completion of the programme gains the ability and readiness to develop, organize and run a business enterprise, along with any of its uncertainties in order to make a profit.

Activities to be given:

Visit to a Dairy farm, observe and learn the techniques practiced at Industry level to promote Employability skill and motivate entrepreneurial skill.

Annexure - 8

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Upto K levels)
CLO1	Impart knowledge and skills required concerning breeds of dairy cattle, management of animals of different physiological status.	K1 to K3
CLO2	Able to classify feeds according to their nutritive values, health, housing and feeding.	K1 to K3
CLO3	Principles and practices essential in the production of clean milk. Students will know the different types of milk products, milk quality and its management.	K1 to K3
CLO4	Analysis of Cattle breed diseases	K1 to K3
CLO5	Completion of the programme may seek group employment in private dairy farm, milk processing plants and dairy product factories.	K1 to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	1	2	3	2
CLO2	3	3	2	3	3	2
CLO3	3	3	1	2	2	1
CLO4	3	2	2	1	1	2
CLO5	3	3	1	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN: TOTAL HOURS (30Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**Unit I** Dairy Farming-Definition, Scope, Dairy breeds of India and its classification. Exotic cow breed- Jersey and Red Sindhi. Buffalo-Murrah and Surti. Goat –Jamunapari and Malapuri.	6	Chalk and Talk, PPT, group discussion, quiz, on the spot test.
II	**Unit II** Common cattle feed and their nutritive values. Rations-its computational and qualities-Balanced ration. Anatomy and physiology of mammary glands. Milk secretion and importance of Colostrum.	6	Chalk and Talk, PPT, group discussion, quiz, on the spot test.
III	**Unit III** Milk composition-Nutritive value. Pasteurization of milk –spoilage of milk. Milk products-Butter, Cream, Khoa and Ghee. Adulteration of milk.	6	Chalk and Talk, PPT, group discussion, quiz, on the spot test.
IV	**Unit IV** Viral diseases-Cow pox-Foot and mouth disease-Rinder pest. Bacterial diseases –Anthrax-MastitisTuberculosis-Haemorrhagic septicemia. Non-contagious diseases-Milk fever, Parasites of dairy breeds	6	Chalk and Talk, PPT, group discussion, quiz, on the spot test.
V	**Unit V** Role of Co-operative societies in milk production and marketing. Techniques adopted in cattle breeding – inbreeding, Outbreeding and Artificial insemination. Merits and demerits of Dairy Business.	6	Chalk and Talk, PPT, group discussion, quiz, on the spot test.

Course Designer:
Ms.R.S.Rajalakshmi

Annexure - 8

Department of Zoology					Class: I UG			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
I	Inter Disciplinary Course	22OUZOID1	Applied Zoology	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	**Entrepreneurship oriented**
		✔

Course Objectives

1. To enhance the skill and encourage students to contribute to the economy.
2. Examine the potential for self-employment.
3. Prepare the pupils for employment in rural areas that focuses on the social welfare.
4. Emphasize your knowledge of agro ecosystem-cottage industry auxiliary activities.
5. To know the value of dairy products, its efficacy in human livelihoods, as well as to impart useful information on dairy farming

Course Content:

Unit-I Sericulture - Introduction to Sericulture – Types of silk worms – culture of Mulberry silkworms-Diseases and enemies of silkworms – Uses of silk- Ahimsa silk.

Unit-II Apiculture - Introduction to Apiculture – Types of Honey Bee – Bee Keeping – Precautions – Products of Bee keeping – Economic Products of Bee Keeping – Economic importance of honey – Enemies and diseases of bees – Bee Keeping industry.

Unit-III Aquaculture – Aquaculture in India – Culturable organisms- *Catla catla, Labeo rohita* (Rohu) – Culture of Indian major carp (Fin fish culture)- Biology of Pearl oyster- Scope of aquaculture..

Unit-IV Poultry- Commercial layers and broilers. Poultry housing- Deep litter system, Debeaking**.** Poultry diseases- Viral disease (Ranikhet), Bacterial disease (Fowl cholera), Fungal disease (Brooder's pneumonia) and Parasitic diseases (Tick fever) Vaccination programme.

Unit-V Dairy farming - Breeds of cattle (Gir & Red Sindhi) dairy products-Management. Diseases and mode of prevention (Foot and Mouth Disease and Mastitis). **Women entrepreneur** – Self-help groups- Marketing –Management.

Books for study:

1. Arumugam ,N., (2012). "*Applied Zoology",* Saras Publications.

Annexure - 8

Reference Books:

1. Abrol, D.P. (1997) Bees *and Bee keeping in India*, Kalyani Publishers, Ludhiana.
2. Gnanamani. M.R. (1978) *Modern aspects of commercial* Poultry *Science*, GIRI Publications, Madurai.
3. Jhingran. V.G. (2002) *Fish and fisheries of India*, Hindustan Publishing Corporation, Delhi.
4. Krishnan. N.T. (1993) *Economic Entomology*, J.J. Publications, Madurai,
5. Khanka.S.S. (2012) *Entrepreneurial Development*, S. Chand & Company Ltd.

Web Resources/ E.Books:

http://www.youtube.com/watch?v=sxyA94oqypA

http://www.youtube.com/watch?v=tSg-Zgps-d0

Pedagogy:

Chalk and Talk, PPT, group discussion quiz, on the spot test and Cross word puzzle activity

Rationale for nature of Course:

Entrepreneurship oriented: The knowledge acquired on applied Zoology will help the students to develop their entrepreneurial skills that enable them to become a successful entrepreneur.

Activities to be given:

- Observation and Collection of specimens through field visits.
- Collection of articles published in the dailies related to entrepreneurship relevant to the subject.

Annexure - 8

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (Upto K level)
CLO1	Elaborate the different methods of Rearing mulberry silkworm. Able to understand and gain knowledge about the culturing methods of mulberry silkworm and their uses.	K1 to K3
CLO2	Utilize the obtained information to manage apiaries	K1 to K3
CLO3	Attain skills in aquaculture and harvesting methods	K1 to K3
CLO4	Able to apply their knowledge in poultry and rearing management and elaborate on disease causing microbes, parasites and vaccination methods.	K1 to K3
CLO5	Able to become a successful women entrepreneur and become aware of dairy breeds and their management by inculcating knowledge .	K1 to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (SCIENCE)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	1	2	3	2
CLO2	3	3	2	3	3	2
CLO3	3	3	1	2	2	1
CLO4	3	2	2	1	1	2
CLO5	3	3	1	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) (ARTS)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	3	1	2	3	2
CLO2	3	3	2	3	3	2
CLO3	3	3	1	2	2	1
CLO4	3	2	2	1	1	2
CLO5	3	3	1	2	3	1

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN: TOTAL HOURS (30 Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**Unit –I Sericulture -** Introduction to Sericulture – Types of silk worms – culture of Mulberry silkworms-Diseases and enemies of silkworms – uses of silk-ahimsa silk	5	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	**Unit –II Apiculture -** Introduction to Apiculture – Types of Honey Bee – Bee Keeping – Precautions – Products of Bee keeping – Economic Products of Bee Keeping – Economic importance of honey – enemies and diseases of bees – Bee Keeping industry	6	Chalk and Talk, PPT, group discussion , quiz, on the spot test
III	**Unit -III Aquaculture -** Qualities of cultivable fishes – Types of Fish farming .Fish culture – Breeding ponds – nursery ponds – rearing ponds – stocking ponds – Harvesting – Preservation of fishes-fish feed.	6	Chalk and Talk, PPT, group discussion , quiz, on the spot test
IV	**Unit – IV Poultry**- Commercial layers and broilers. Poultry housing- deep litter system, Debeaking Poultry diseases- viral disease (Ranikhet), bacterial disease (Fowl cholera), fungal disease (Brooder's pneumonia) and parasitic diseases (Tick fever) Vaccination programme.	6	Chalk and Talk, PPT, group discussion , quiz, on the spot test
V	**Unit- V Dairy farming** - Breeds of cattle's- (Gir & Red Sindhi) dairy products-management. Diseases and mode of prevention (Foot and Mouth Disease and Mastitis). **Women entrepreneur** – self help groups- marketing - Management	7	Chalk and Talk, PPT, group discussion , quiz, on the spot test

Course Designer:
Mrs.S.Sharmila

Annexure - 8

Department of Zoology					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
II	Core	22OUZO21	Chordata	4	4	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship oriented
✔		

Course Objectives

1. To understand the basic and systematic classification of Chordates.
2. To discuss diversity, adaptations , Organisation and taxonomic status of Chordates
3. To understand the origin and evolutionary relationship in different subphylum of Chordates
4. To understand the ecological role of different groups of Chordates.
5. To make students learn and describe unique characters of Urochordates, Cephalochordates and fishes.

Course content:

Unit – I Prochordata, Agnatha & Pisces - General characters and classification of Prochordata, Agnatha and Pisces upto Order level.Prochordata: Amphioxus and Balanoglossus –Structural Organisation & Affinities of Balanoglossus, Ascidian- Retrogressive metamorphosis- Agnatha : Structure & Affinities of Cyclostomata (Petromyzon)- Pisces : *Scoliodon sorrakowah*- lateral line sense organ and *Dipnoi (*Lung Fishes*)* – Structural Organisation,

General topic-Accessory Respiratory organs of fishes.

Unit – II Amphibia - General characters and classification of Amphibia upto order level- *Rana hexadactyla*- Structural Organization-Respiratory system- *Gymnophiana* (Apoda - Legless): Structure and Biological significance- Origin of Amphibia-Characteristics of South Indian Amphibians-. *Bufo, Rachophorus,.Hyla.*

General topic: Parental care in Amphibia.

Unit – III Reptilia - General characters and classification of Reptilia upto order level- *Calotes versicolor*- Structural Organization- urinogenital system- *Sphenodon:*Structure-Snakes of

South India - .*Naja naja*, .(Cobra) *Viper russelli* (Russell's viper),.*Hydrophis* (Sea snake) - Poison apparatus, Biting mechanism , Venom and First aid methods.

General topic- Identification of Poisonous snakes and non Poisonous snakes.

Unit – IV AVES - General characters and classification of Aves upto order level- *Columbia livia*- Structural Organization, Physiology of eye- Flight adaptations in birds- Flightless birds and their distribution

General topic - Migration in birds.

Unit – V Mammalia & Comparative Studies - General characters and classification of mammalia upto order level-*Oryctolagus cunniculus*- Structural Organisation-circulatory system- Aquatic and flying Mammals.

General topics -Origin of Chordates and Tetrapod limbs.

Books for Study:

1. Ekambaranatha Ayyar and T.N.Ananthakrishnan, (1995). "*A Manual of Zoology"*.Vol 2 (Part 1 & 2), S. Viswanathan, Chennai
2. Jordan E.L and P.S. Verma, (2000). *"Chordate Zoology"* S. Chand, New Delhi.

Books for Reference:

1. De Beer G, (1966), "*Vertebrate Zoology*", Sedgwick & Jackson, London.
2. Young J.Z, (1950), *"The Life of Vertebrates"*, Oxford University Press, London.
3 Alexander R.M.C.N., (1981)"*The Chordata"* Cambridge University Press., New York.
4. Kotpal. R.L.,(2009). *"Modern Text Book of Zoology Vertebrates"* 3rd Edition Rastogi Publications.
5. Romer A.S. & Parson, T.S (1986). "*A Vertebrate body*", W.B Saunders, Philadelphia.
6. Newman. H.H, (1939). "*The Phylum Chordata*", Mc Millan, New York.
7. Nigam.H.C.,(2021). Ist edition, "*Comparative Anatomy of Vertebrates*" Ist edition,Vishal Publishing Co.,
8. Nair N.C.*et.al*., (2012)."*A text book of Chordata"* Saras Publications.

Annexure - 8

Web Resources/ E.Books:

https://books.google.co.in/books?id=IgA3fKgx-NYC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

http://chromeextension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.uou.ac.in/sites/default/files/slm/BSCZO-201.pdf

https://archive.org/details/in.ernet.dli.2015.262640/page/n1/mode/2up

Pedagogy:

Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs. Charts, e-journals, Different channels of TV – Animal planet, Discovery, National Geographic.

Rationale for nature of Course:

Knowledge and Skill : Students will be able to obtain knowledge and habitat of the various kinds of domestic and wild animals.

Activities to be given:

- Collection of chordate specimens , information's gathered through news papers Journals and media .
- Counting and identification of birds within the campus.
- Celebrating wild life week among students focusing endangered species

Annexure - 8

Course learning Outcomes (CLOs):

CLO	Course Outcome Statements	Knowledge According to Bloom's Taxonomy (Upto K level)
CLO1	Elaborate the basic level of organization and learn the basic concepts about chordates	K1 to K3
CLO2	Acquire the knowledge on the ecology of some important classes in phylum Chordata i.e., Amphibia	K1 to K3
CLO3	Differentiate poisonous and non-poisonous snakes of South India and the first aid for snake bite.	K1 to K3
CLO4	Identify flightless birds and elaborate the flight adaptation and bird migration.	K1 to K3
CLO5	Explain the behavioural adaptations of mammals.	K1 to K4

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

K4- Examining, analyzing, presentation and make inferences with evidences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	1	1	2	3	2
CLO2	3	1	1	1	3	2
CLO3	3	1	1	1	3	2
CLO4	3	1	2	3	3	2
CLO5	3	2	1	2	2	3

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN : TOTAL HOURS (60 Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**Unit – I Prochordata, Agnatha & Pisces -** General characters and classification of Prochordata, Agnatha and Pisces upto Order level.Prochordata: Amphioxus and Balanoglossus –Structural Organisation & Affinities of Balanoglossus, Ascidian- Retrogressive metamorphosis- Agnatha : Structure & Affinities of Cyclostomata (Petromyzon)- Pisces : *Scoliodon sorrakowah*- lateral line sense organ and *Dipnoi (*Lung Fishes*)* – Structural Organisation, **General topic**-Accessory Respiratory organs of fishes.	12	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.
II	**Unit – II Amphibia -** General characters and classification of Amphibia upto order level- *Rana hexadactyla*- Structural Organization-Respiratory system- *Gymnophiana* (Apoda - Legless): Structure and Biological significance- Origin of Amphibia-Characteristics of South Indian Amphibians-. *Bufo, Rachophorus,.Hyla.* **General topic**: Parental care in Amphibia.	10	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.
III	**Unit – III Reptilia -** General characters and classification of Reptilia upto order level- *Calotes versicolor*- Structural Organization- urinogenital system- *Sphenodon:*Structure-Snakes of South India - .*Naja naja*, .(Cobra) *Viper russelli* (Russell's viper),.*Hydrophis* (Sea snake) - Poison apparatus, Biting mechanism , Venom and First aid methods. **General topic-** Identification of Poisonous snakes and non-Poisonous snakes.	13	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs
IV	**Unit – IV AVES -** General characters and classification of Aves upto order level- *Columbia livia*- Structural Organization, Physiology of eye- Flight adaptations in birds- Flightless birds and their distribution **General topic** - Migration in birds.	13	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs
V	**Unit – V Mammalia & Comparative Studies -** General characters and classification of mammalia upto order level-*Oryctolagus cunniculus*- Structural Organisation-circulatory system- Aquatic and flying Mammals. **General topics** -Origin of Chordates and Tetrapod limbs.	12	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs

Course Designer:
Dr.(Mrs).G.Indira Rani

Annexure - 8

Department of Zoology					Class: I B.Sc			
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
II	Skill Enhancement Course	22OUZOSE21	Vermitechnology	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	**Entrepreneurship oriented**
		✓

Course Objectives

1. To impart the knowledge on the identification and biology of earthworms.
2. To foster the skills on the preparation of quality vermicompost and vermiwash by recycling the waste .
3. To understand the prospects and marketing strategies of vermitechnology
4. To make them become entrepreneurs.
5. To understand the ill effects of chemical fertilizers and relay on Organic manure.

UNIT –I Introduction of Earthworm - General morphology of earthworm – body structure, colour, anatomy, biology, reproduction. Three common species: *Eisenia foetida*, *Eudrilus eugeniae*, *Megascolex mauritii*. Definitions of vemiculture, vermicompost,vermitechnology.

UNIT – II Vermiculture and production of Vermicompost: Types of vermicomposting: small scale and large scale. Requirements: environmental-air, moisture.temperature. Setting up a vermiculture unit. Value addition through enrichment of vermicompost.

UNIT – III Vermicomposting –Schemes, maintanence of beds ,harvesting worms and vermicompost.Quality, chemical composition of vermicompost, properties and advantages over chemical fertilizers. Packaging and Marketing- cost benefit analysis. Vermicompost as quality manure.

Unit- IV Vermiwash - Constituents of Vermiwash- its applications. Uses of earthworms in animal feed industry (biochemical and biotechnological studies) and medicine(ayurvedic and unani) .

Unit V: Natural enemies of earthworms: Pests (Termites), parasites(Nematodes-Rhabditis) and pathogens(Roundworm) affecting earthworms. Bioremediation through vermitechnology. . Funding agencies and schemes for women enterpreneurs.

Books for Study:

1. M. Seethalekshmy & R.Santhi , (2012),"*Vermitechnology",* Saras Publications .
2. Ranganathan, L.S.,(2006). "*Vermicomposting Technology*" – From Soil Health to Human Health.
3. P.K.Gupta, (2005), "*Vermicomposting for Sustainable Agriculture*", Reprint Jodhpur, Agrobios, India.
4. Ismail,S.A,.(1997),"*Vermicology",* The biology of Earthworm. Orient Longman, India.

Books for Reference :

1. Tripathi G, (2003) ,"*Vermisource Technology",* Discovery Publishing House,
2. T.V Sathe,.(2004) ,"*Vermiculture and Organic Farming*". Daya Publishing House,
3. Edwards,C.A,.Bohlen,P.J, Lindon,D.R and Subler,S , (1995)."*Earthworms in Agroecosystems*. In:Earthworm Ecology and Biogeography in North America" Lewis Publisher,Boca Raton., FL,PP:185-213.
4. Edwards,C.A & Bohlen,P.J,., (1996), "*Biology and Ecology of Earthworms"* 3rd Edition.,Springer Science & Business Media.

Web Resources/ E.Books:

https://www.studocu.com/in/document/sam-higginbottom-university-of-agriculture-technology-and-sciences/horticulture/vermitechnology-lecture-notes-2-3/24833267

https://www.youtube.com/watch?v=9u-UEqiUZtk

https://www.vedantu.com/biology/vermiculture

https://www.kngac.ac.in/elearning-portal/ec/admin/contents/4_18K4ZEL02_2021012803204629.pdf

https://www.pdfdrive.com/vermitechnology-e45751760.html

Pedagogy:

Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.

Rationale for nature of Course:

Entrepreneurship oriented : After completion of the programme student gains ability and readiness to develop, organize and run a business enterprise, along with any of its uncertainties in order to make a profit.

Activities to be given:

- To collect the waste degradable materials around the campus.
- To set the vermibed for predigestion and inoculate the Earthworms.
- To recover the produced vermicompost and vermiwash .
- To pack and market the produced vermicompost and vermiwash within the campus.

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (upto K level)
CLO1	Establish a broad understanding of the morphology of Earthworms and terminologies related to basic concepts of Vermitechnology.	K1 to K3
CLO2	Exposure to Vermiculture and vermicomposting technique.	K1 to K3
CLO3	Apply the knowledge of preparation of Vermicompost and analyse its manurability.	K1 to K3
CLO4	Analyze the significance of preparing vermiwash (liquid fertilizer) and earthworms in food industry.	K1 to K3
CLO5	Aware of natural enemies of earthworms and understand the value of them to the ecosystem.To discuss on some of the funding agencies available.	K1 to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	2	2	3	3
CLO2	2	3	2	2	3	3
CLO3	3	3	1	2	3	2
CLO4	3	2	3	2	3	2
CLO5	2	3	2	3	3	2

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN : TOTAL HOURS(30 Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**UNIT –I Introduction of Earthworm** - General morphology of earthworm – body structure, colour, anatomy, biology, reproduction. Three common species: *Eisenia foetida*, *Eudrilus eugeniae*, *Megascolex mauritii*. Definitions of vemiculture, vermicompost,vermitechnology.	8	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.
II	**UNIT – II Vermiculture and production of Vermicompost:** Types of vermicomposting: small scale and large scale. Requirements: environmental-air, moisture.temperature. Setting up a vermiculture unit. Value addition through enrichment of vermicompost.	6	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.
III	**UNIT – III Vermicomposting** –Schemes, maintanence of beds ,harvesting worms and vermicompost.Quality, chemical composition of vermicompost, properties and advantages over chemical fertilizers. Packaging and Marketing- cost benefit analysis. Vermicompost as quality manure.	4	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs
IV	**Unit- IV Vermiwash** - Constituents of Vermiwash- its applications. Uses of earthworms in animal feed industry (biochemical and biotechnological studies) and medicine(ayurvedic and unani) .	4	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs
V	**Unit V:** Natural enemies of earthworms: Pests (Termites), parasites(Nematodes-Rhabditis) and pathogens(Roundworm) affecting earthworms. Bioremediation through vermitechnology. . Funding agencies and schemes for women enterpreneurs.	8	Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs

Course Designer:
Dr.(Mrs.)M.A.SONIYA

Annexure - 8

Department of Zoology			Class :I B.Sc					
Semester	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
II	Skill Enhancement Course	22OUZOSE22	Aquaculture	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	**Entrepreneurship oriented**
✓		✓

Course Objectives :

1. To produce protein rich ,nutritive ,palatable and easily digestible human food.
2. To produce ornamental fish for aesthetic appeal.
3. To make learners aware of the means of livelihood through commercial and industrial aquaculture.
4. To learn the formation of pearl oyster culture.
5. To discuss the need of water quality management in aquaculture farms.

Course Content:

UNIT – I Introduction -Need and scope of aquaculture- Aquaculture potentials of India - Inland Fishery resources- cultivable fishes.

UNIT – II Culture -Monoculture – poly culture- pen culture – cage culture – Raft culture – its problems – Integrated fish farming- paddy cum fish culture and salt cum shrimp culture.

UNIT - III Enemies-Predators – control measures – Aquatic weeds and their control measures – Types of fishing nets – Marketing.

UNIT – IV Pearl fishery-Pearl oyster culture – pearl formation. Mass culture of live feed Artemia, Algae, Spirullina and Daphnia.

UNIT – V Prawn culture-Fresh water prawn culture-hatchery stocking density – fresh water fish farming – selection of pond, construction, water quality management – conditioning the pond.

Books for Study:

1. Arumugam .,(2012) "*Aquaculture*". , Saras Publication.
2. Santhana Krishnan,G.,(1992) "*Aquaculture"., J.*J Publications.

Annexure - 8

Books for Reference:

1. Bal.D.V and Rao K.V.,(1984),"*Marine Fisheries"*.,Tata McGraw Hill Publishing Co- Ltd
2. Jhingran,V.G., *(*1982 *),"Fish and Fisheries of India"*., Hindustan.Publications
3. Marshall.N.B., (1971),"*The exploration in the Life history Of fishes"*.,Harvard University Press., Cambridge,MA.

Web Resources/ E.Books:

https://www.youtube.com/watch?v=xT_7F79nkt8

https://www.youtube.com/watch?v=IPBObhgtnhE

https://www.youtube.com/watch?v=fPrSWAt7cAY

Pedagogy:

Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.

Rationale for nature of Course:

Knowledge and Skill Oriented : Knowledge on various kinds of cultivable fishes, prawns , oysters that enable students take up jobs in private aqua farms.

Entrepreneurship oriented : It enables the students for small-scale cultivation of aqua farm .

Activities to be given: Visit to Aqua Farms and take up field study.

Annexure - 8

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy (upto K level)
CLO1	Able to make students secure self employment opportunities after their graduation.	K1 to K3
CLO2	Attain proper knowledge in all aspects of different culturable methods of aquatic organisms.	K1 to K3
CLO3	Establish prey and predator relationships and modern tools used in the capture of aquatic organisms.	K1 to K3
CLO4	Distinguish different kinds of phytoplanktons and zooplanktons.	K1 to K3
CLO5	Aquire knowledge and establish prawn farming	K1 to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented, Justifying the statement and deriving inferences

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	2	2	3	3
CLO2	2	3	2	2	3	3
CLO3	3	3	1	2	3	2
CLO4	3	2	3	2	3	2
CLO5	2	3	2	3	3	2

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN : TOTAL HOURS(30 Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**UNIT – I Introduction** -Need and scope of aquaculture- Aquaculture potentials of India - Inland Fishery resources- cultivable fishes.	5	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	**UNIT – II Culture** -Monoculture – poly culture- pen culture – cage culture – Raft culture – its problems – Integrated fish farming- paddy cum fish culture and salt cum shrimp culture.	6	Chalk and Talk, PPT, group discussion , quiz, on the spot test
III	**UNIT - III Enemies-**Predators – control measures – Aquatic weeds and their control measures – Types of fishing nets – Marketing.	6	Chalk and Talk, PPT, group discussion , quiz, on the spot test
IV	**UNIT – IV Pearl fishery-**Pearl oyster culture – pearl formation. Mass culture of live feed Artemia, Algae, Spirullina and Daphnia.	6	Chalk and Talk, PPT, group discussion , quiz, on the spot test
V	**UNIT – V Prawn culture-**Fresh water prawn culture-hatchery stocking density – fresh water fish farming – selection of pond, construction, water quality management – conditioning the pond.	7	Chalk and Talk, PPT, group discussion , quiz, on the spot test

Course Designer:
Miss.R.S.Rajalakshmi

Annexure - 8

Department of Zoology			Class :I UG					
Semester	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
II	Interdisciplinary Course	22OUZOID1	Ornamental Fish Culture	2	2	25	75	100

Nature of the Course		
Knowledge and Skill Oriented	Employability Oriented	**Entrepreneurship oriented**
		✔

Course Objectives

1. To learn the basic principles and techniques of Ornamental fish culture.
2. To study the salient features of popular ornamental fishes.
3. To get an exposure on setting up and maintenance of aquarium.
4. Acquire knowledge on principles, designing and maintenance of an aquarium.
5. Motivation to take up entrepreneurship through ornamental fish culture.

Course Content :

UNIT-I Introduction to Ornamental fish culture-Indian and world scenario - Advantages of ornamental fish culture - Setting up home aquarium - Aquarium tank: types (Metal framed glass tank, All glasses tank, Acrylic tank, Laminated glass tank) - Materials required for the construction of tanks - Features of Aquaponics.

UNIT-II Management-Water quality management - Heating – Lighting – Aeration - Filtering (mechanical, chemical and biological) - Aquarium equipments - Aquarium plants-hydroponics.

UNIT –III Ornamental Fishes-Salient features of Goldfish, Siamase Fighter fish, Molly fish, Cichlids Clownfish, Angel fish and Guppy fishes.

UNIT-IV Food & Feeding: Nutritional requirements for fish, live feed, artificial feed, composition of ideal fish feed - **Parasites & Diseases**: Argulosis (Ecto parasites) & Fin rot disease (Bacterial disease) and Carp pox (Viral disease)

UNIT-V Marketing-Ornamental fish Transportation and packing : Methods (open and closed packing), starvation and sedation, factors to be considered for packaging (Density, temperature, dissolved gases, salinity, anaesthetics). Management practices of ornamental fish farms. Conditioning and quarantine methods. Trade regulations and wild life act in relation to ornamental fishes.

Annexure - 8

Books for study:

1.Tharadevi, C.S. and K.V. Jayashree. (2009). "*Home Aquarium*", Saras Publications, Nagercoil.

2. Arumugam, N. (2010). "*Aquaculture*". Saras Publications, Nagercoil.

Books for reference:

1. Shukla, J.P. (2012) ,"*Fish and Fisheries*". Rastogi Publications. New Delhi.

2. Zade, S.B., C.J. Khune, S.R. Sitre and R.V. Tijare.(2011),"*Principles of Aquaculture*". Himalaya Publishing House. Mumbai.

3.Srivastava, C.B.L. (2006). "*Aquarium-Fish Keeping*". Kitab Mahal, Allahabad.

Web Resources/ E.Books:

https://www.youtube.com/watch?v=xT_7F79nkt8

https://www.youtube.com/watch?v=IPBObhgtnhE

https://www.youtube.com/watch?v=fPrSWAt7cAY

Pedagogy:

Chalk and Talk, PPT, group discussion , OHP presentations, quiz, on the spot test and Virtual Labs.

Rationale for nature of Course:

Entrepreneurship Oriented:

Knowledge on ornamental fishes attracts students to become entreprenurs.

Activities to be given:

Visit to Fish Farm, setting up of aquarium at homes.

Annexure - 8

Course learning Outcomes (CLOs):

CLO	Course Outcomes Statement	Knowledge According to Bloom's Taxonomy(upto K level)
CLO1	Possess knowledge on principles, designing and maintenance of an aquarium.	K1 to K3
CLO2	Become an entrepreneur in ornamental fish culture.	K1 to K3
CLO3	Possess the skills in culturing various kinds of fishes.	K1 to K3
CLO4	Make students aware fish food production and health related problems with ornamental fishes.	K1 to K3
CLO5	Able to market the product and elaborate on trade regulations.	K1 to K3

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3- Application oriented- Solving Problems

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	2	2	3	3
CLO2	2	3	2	2	3	3
CLO3	3	3	1	2	3	2
CLO4	3	2	3	2	3	2
CLO5	2	3	2	3	3	2

1-Basic Level 2- Intermediate Level 3- Advanced Level

Annexure - 8

LESSON PLAN : TOTAL HOURS(30 Hrs)

UNIT	DESCRIPTION	Hrs	MODE
I	**UNIT-I Introduction to Ornamental fish culture**-Indian and world scenario - Advantages of ornamental fish culture - Setting up home aquarium - Aquarium tank: types (Metal framed glass tank, All glasses tank, Acrylic tank, Laminated glass tank) - Materials required for the construction of tanks - Features of Aquaponics.	5	Chalk and Talk, PPT, group discussion , quiz, on the spot test
II	**UNIT-II Management**-Water quality management - Heating – Lighting – Aeration - Filtering (mechanical, chemical and biological) - Aquarium equipments - Aquarium plants-hydroponics.	6	Chalk and Talk, PPT, group discussion , quiz, on the spot test
III	**UNIT –III Ornamental Fishes**-Salient features of Goldfish, Siamase Fighter fish, Molly fish, Cichlids Clownfish, Angel fish and Guppy fishes.	4	Chalk and Talk, PPT, group discussion , quiz, on the spot test
IV	**UNIT-IV Food & Feeding**: Nutritional requirements for fish, live feed, artificial feed, composition of ideal fish feed - **Parasites & Diseases**: Argulosis (Ecto parasites) & Fin rot disease (Bacterial disease) and Carp pox (Viral disease)	7	Chalk and Talk, PPT, group discussion , quiz, on the spot test
V	**UNIT-V Marketing**-Ornamental fish Transportation and packing : Methods (open and closed packing), starvation and sedation, factors to be considered for packaging (Density, temperature, dissolved gases, salinity, anaesthetics). Management practices of ornamental fish farms. Conditioning and quarantine methods. Trade regulations and wild life act in relation to ornamental fishes.	8	Chalk and Talk, PPT, group discussion , quiz, on the spot test

Course Designer:
Mrs.S.Sharmila

Annexure - 8

Department of Zoology			Class :I B.Sc					
Semester	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours / Week**	**CIA**	**SE**	**Total**
I & II	Core Lab	22OUZO2P	Core Lab in Invertebrata & Chordata	2	2	40	60	100

Nature of the Course		
Knowledge and Skill Oriented	**Employability Oriented**	Entrepreneurship oriented
✓	✓	

Mountings:

Body Setae of Earthworm

Salivary Glands of Cockroach

Sting of Honey Bee

Placoid Scales of Shark

Virtual Dissections:

Nervous system of Earthworm

Digestive system of Cockroach

Reproductive system of Cockroach

Ventral nerve of Frog (Procedure with illustration)

Brain of frog (Procedure with illustration)**.**

Spotters/Slides

INVERTEBRATE

Paramecium Entire, *Entamoeba histolytica* , Spicules and Gemmules, *Physalia* , *Aurelia Taenia solium,* Liver fluke entire, Chaetopterus, Heteroneries. Peripatus, Sacculina. Nautilus, Chiton, Star Fish and Sea- urchin.

CHORDATA

Amphioxus, Balanoglossus,Ascidian, Petromyzon, Echeneis,Hippocampus, Rhacophorus , Salamander,Bufo. Naja naja, Draco,Chaemeleon, Duck,Kite (beak and claw adaptations) , Bat,Echidna, Fore and hind limbs of rabbit, Synsacrum of Bird, Skull of Calotes.

Field trip compulsory- A Report

Annexure - 8

Books for References:

1. Jayasurya, NairN.C, Soundarapandian N, Arumugam N, Leelavathy S and Murugan T, (2013)," Practical Zoology Vol 1 Invertebrata, Saras publication, Nagercoil.
2. Jayasurya, Thangamani A,Arumugam N, Prasanakumar S Andnarayanan Lm, (2013), Practical Zoology Vol. 2 Chordata , Saras Publication , Nagercoil.
3. Sinha J, Chatterjee A.K, And Chattopadhyay P, (2011), Advanced Practical Zoology , Books and Allied (P) Ltd., Kolkata.

Web Resources:

https://www.youtube.com/watch?v=wF7ew2w24as

https://www.youtube.com/watch?v=mjn4QUdYADg

Pedagogy

PPT, Group Discussion , Interaction, Quiz, Tutorial And Virtual Labs.

Annexure - 8

LESSON PLAN for practical (Total hours : 60)

Cycle	Description	Staff Name Hrs	Mode
Mountings			
1	Body setae of Earth worm	4	Mounting
2	Salivary glands of Cockroach	4	Mounting
3	Placoid scales of Shark	4	Mounting
4	Sting of Honey Bee	4	Mounting
Dissection			
5	Nervous system of Earthworm	2	Procedure with illustration
6	Digestive system of Cockroach	2	Procedure with illustration
7	Ventral nerve of frog(procedure with illustration)	4	Procedure with illustration
8	Arterial system of calotes	4	Procedure with illustration
9	Brain of frog	4	
Spotters			
10	Paramoecium conjucation,Entamoeba histolytica	2	Slides
11	Elphidium, Noctiluca, Spicules, Obelia	2	Slides, Specimen
12	Physalia, Porpita, Pennatula, Adamsia	2	Specimens, Images
13	Fungia, Tape worm, Cercaria, Liver fluke,	3	Specimens, Images
14	Planaria, Ascaris, Dracunculus, Chaetopterus	3	Specimens, Images
15	Internal Practical Test - I	3	

Course Designer:
Dr.(Mrs)G.Indira Rani

Annexure - 8

EVALUATION (PRACTICAL)

Internal (Formative)	: 40 marks
External (Summative)	: 60 marks
Total	:100 marks

Question Paper Pattern for Internal Practical Examination: 40 Marks

Components	Marks
I – Major question	15
II - Minor question	08
III-Spotter (4 x 3)	12
IV –Record book	05
Total	**40**

Question Paper Pattern for External Practical Examination (Major) : 60 Marks

Components	Marks
I – Major question	20
II - Minor question	15
III-Spotter (4 x 5)	20
IV –Record book	5
Total	**60**

In respect of external examinations passing minimum is **35% for Under Graduate** Courses and in total, **aggregate of 40%.**

Latest amendments and revisions as per **UGC** and **TANSCHE** norm is taken into consideration to suit the changing trends in the curriculum.