FATIMA COLLEGE

(Autonomous)

Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625 018, Tamil Nadu

NAME OF THE DEPARTMENT: ZOOLOGY

NAME OF THE PROGRAMME : B.Sc

PROGRAMME CODE : UAZO

ACADEMIC YEAR :2021-2022

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

DEPARTMENT OF ZOOLOGY

For those who joined in June 2019 onwards

PROGRAMME CODE: UAZO

PART – I – TAMIL / FRENCH / HINDI– 12 CREDITS

PART – I – TAMIL

Offered by The Research Centre of Tamil

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	I	19TL1C1	General Tamil – Ikaala Ilakiyam	5	3	40	60	100
2.	II	19TL2C2	General Tamil - Bakthi Illakiyam	5	3	40	60	100
3.	III	19TL3C3	General Tamil – Kaapiya Illakiyam	5	3	40	60	100
4.	IV	19TL4C4	General Tamil - Sangam Illakiyam	5	3	40	60	100
			Total	20	12			

PART – I –FRENCH

Offered by TheDepartment of French

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	I	19RL1C1	PART 1 LANGUAGE FRENCH - LE NIVEAU	5	3	40	60	100

S. NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
			INTRODUCTIF					
2.	II	19RL2C2	PART 1 LANGUAGE FRENCH - LE NIVEAU DÉCOUVERTE	5	3	40	60	100
3.	III	19RL3C3	PART 1 LANGUAGE FRENCH - LE NIVEAU INTERMEDIAIRE	5	3	40	60	100
4.	IV	19RL4C4	PART 1 LANGUAGE FRENCH - LE NIVEAU DE SUIVRE	5	3	40	60	100
			Total	**20**	**12**			

PART – I – HINDI

Offered by TheDepartment of Hindi

S. NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	I	19DL1C1	PART 1 LANGUAGE HINDI - Vyakaran aur Karyalyeen Hindi	5	3	40	60	100
2.	II	19DL2C2	PART 1 LANGUAGE HINDI –Srijanatmak Hindi aur Gadhya	5	3	40	60	100
3.	III	19DL3C3	PART 1 LANGUAGE HINDI –Hindi Sahithya Ka Aadhikaal aur	5	3	40	60	100

S. NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
			Bhakthikaal					
4.	**IV**	19DL4C4	PART 1 LANGUAGE HINDI –Reetikaleen Hindi Sahithya aur Aadhunik Kaal	**5**	**3**	**40**	**60**	**100**
			Total	**20**	**12**			

PART – II -ENGLISH – 12 CREDITS

Offered by The Research Centre of English

S. NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
1.	**I**	19EL1LB	BASIC COMMUNICATIVE ENGLISH	5	3	40	60	100
2.		19EL1LI	INTERMEDIATE COMMUNICATIVE ENGLISH					
3.		191EL1LA	ADVANCED COMMUNICATIVE ENGLISH					
4.	**II**	19EL2LB	ENGLISH FOR EFFECTIVE COMMUNICATION (BASIC)	5	3	40	60	100
5.		19EL2LI	ENGLISH FOR EMPOWERMENT (INTERMEDIATE)					
6.		19EL2LA	ENGLISH FOR CREATIVE WRITING					

S. NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. MKs
			(ADVANCED)					
7.	**III**	19EL3LN	ENGLISH FOR THE DIGITAL ERA	5	3	40	60	100
8.	**IV**	19EL4LN	ENGLISH FOR INTEGRATED DEVELOPMENT	5	3	40	60	100
			Total	**20**	**12**			

PART – III -MAJOR, ALLIED & ELECTIVES – 95 CREDITS

MAJOR CORE COURSES INCLUDING PRACTICALS : 60 CREDITS

S.NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. Mks
1.	I	19Z1CC1	INVERTEBRATA	5	4	40	60	100
2.		19Z1CC2	CELL BIOLOGY	4	3	40	60	100
3.		19Z1CC3	LAB - INVERTEBRATA & CELL BIOLOGY	3	2	40	60	100
4.	II	19Z2CC4	CHORDATA	5	4	40	60	100
5.		19Z2CC5	GENETICS	4	3	40	60	100
6.		19Z2CC6	LAB - CHORDATA & GENETICS	3	2	40	60	100
7.	III	19Z3CC7	HUMAN PHYSIOLOGY	5	4	40	60	100
8.		19Z3CC8	ENVIRONMENTAL BIOLOGY	4	3	40	60	100
9.		19Z3CC9	LAB - HUMAN PHYSIOLOGY & ENVIRONMENTAL BIOLOGY	3	2	40	60	100

CBCS Curriculum for B.Sc Zoology

S.NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. Mks
10.	IV	19Z4CC10	MICROBIOLOGY	5	4	40	60	100
11.		19Z4CC11	EVOLUTION	4	3	40	60	100
12.		19Z4CC12	LAB - MICROBIOLOGY& EVOLUTION	3	2	40	60	100
13.	V	19Z5CC13	FUNDAMENTALS OF BIOCHEMISTRY	6	4	40	60	100
14.		19Z5CC14	MOLECULAR BIOLOGY	6	4	40	60	100
15.		19Z5CC15	LAB - BIOCHEMICAL ANALYSIS	4	2	40	60	100
16.		19Z5CC16	LAB - MOLECULAR BIOLOGY	4	2	40	60	100
17.	VI	19Z6CC17	BASIC IMMUNOLOGY	5	4	40	60	100
18.		19Z6CC18	PRINCIPLES OF BIOTECHNOLOGY	5	4	40	60	100
19.		19Z6CC19	LAB - IMMUNOLOGY	3	2	40	60	100
20.		19Z6CC20	LAB - BIOTECHNOLOGY	3	2	40	60	100
			Total	**84**	**60**			

ALLIEDCOURSES- 20 CREDITS

CBCS Curriculum for B.Sc Zoology

S.NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. MKS
1.	I	19C1ACZ1	ALLIED CHEMISTRY - I	3	3	40	60	100
2.		19C1ACZ2	LAB IN VOLUMETRIC ANALYSIS	2	2	40	60	100
3.	II	19C2ACZ3	ALLIED CHEMISTRY - II	3	3	40	60	100
4.		19C2ACZ4	LAB IN QUALITATIVE ORGANIC ANALYSIS	2	2	40	60	100
5.	III	19Z3ACQ1	PLANT DIVERSITY &PATHOLOGY	3	3	40	60	100
6.		19Z3ACQ2	LAB - PLANT DIVERSITY &PATHOLOGY	2	2	40	60	100
7.	IV	19Z4ACQ3	DEVELOPMENTAL BOTANY & PLANT BREEDING	3	3	40	60	100
8.		19Z4ACQ4	LAB - DEVELOPMENTAL BOTANY & PLANT BREEDING	2	2	40	60	100
			Total	**20**	**20**			

ELECTIVES-15 CREDITS

S.No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. Mks
1.	V	19Z5ME1/ 19Z5ME2	BIOSTATISTICS / ANIMAL BEHAVIOUR	5	5	40	60	100
2.	VI	19Z6ME3 / 19Z6ME4	EMBRYOLOGY / CLINICAL LABORATORY TECHNIQUES	5	5	40	60	100
3.		19Z6ME5 / 19Z6ME6	BIOINFORMATICS / ENTOMOLOGY	5	5	40	60	100
			Total	**15**	**15**			

PART – IV – 20 CREDITS

- **VALUE EDUCATION**
- **ENVIRONMENTAL AWARENESS**
- **NON MAJOR ELECTIVE**
- **SKILL BASED COURSES**

S. No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. Mks
1.	I	21G1VE1	Personal Values	1	1	40	60	100
2.		19Z1NME	Non-Major Elective – Maternity and Child Health (Offered to other major Students)	2	2	40	60	100
3.	II	21G2VE2	Values for Life	1	1	40	60	100
4.		19Z2NME	Non-Major Elective – Maternity and Child	2	2	40	60	100

S. No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDITS	CIA Mks	ESE Mks	TOT. Mks
			Health (Offered to other major Students)					
5.	III	19G3EE1	Environmental Education	1	1	40	60	100
6.		19Z3SB1	Vermitechnology	2	2	40	60	100
7.	IV	19G4EE2	Gender Studies	1	1	40	60	100
8.		19Z4SB2	Mushroom Cultivation	2	2	40	60	100
9.	V	19Z5SB3	Ornamental Fish Culture	2	2	40	60	100
10.		19Z5SB4	Sericulture	2	2	40	60	100
11.	VI	19Z6SB5	Apiculture	2	2	40	60	100
12.		19Z6SB6	Dairy Farming	2	2	40	60	100
			TOTAL	**20**	**20**			

PART – V – 1 CREDIT

OFF-CLASS PROGRAMMES - ALL PART-V

SHIFT - I

S. No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDIT	TOT. Mks
1.	I - IV	21A4PED	Physical Education	30/ SEM	1	100
2.		21A4NSS	NSS			
3.		21A4NCC	NCC			
4.		21A4WEC	Women Empowerment Cell			

5.		21A4ACUF	AICUF			

OFF-CLASS PROGRAMMES

ADD-ON COURSES

COURSE CODE	COURSE TITLE	HRS.	CREDITS	SEMESTER IN WHICH THE COURSE IS OFFERED	CIA Mks	ESE Mks	TOTAL Mks
21UAD1CA	**COMPUTER APPLICATIONS**(offered by the department of PGDCA for Shift I)	40	2	I&II	40	60	100
21UADFCS	**ONLINE SELF LEARNING COURSE-** Foundation Course for Science	40	2	II	40	60	100
21UAD3ES	Professional Ethics	15	1	III	40	60	100
21UAD4ES	Personality Development	15	1	IV	40	60	100
21UAD5ES	Family Life Education	15	1	V	40	60	100
21UAD6ES	Life Skills	15	1	VI	40	60	100
19UAD5HR	**HUMAN RIGHTS**	15	2	V	100	-	100
21UAD6RS	**OUTREACH PROGRAMME**- Reach Out to Society through Action**ROSA**	100	3	V & VI	100	-	100
21UAD6PR	**PROJECT**	30	4	VI	40	60	100
21UAD6RC	**READING CULTURE**	10/ Semeste	1	II-VI	-	-	-

COURSE CODE	COURSE TITLE	HRS.	CREDITS	SEMESTER IN WHICH THE COURSE IS OFFERED	CIA Mks	ESE Mks	TOTAL Mks
		r					
	TOTAL		**20**				

EXTRA CREDIT COURSES

COURSE CODE	COURSE	HRS.	CREDITS	SEMESTER IN WHICH THE COURSE IS OFFERED	CIA MKS	ESE MKS	TOTAL MARKS
21Z2SL1	**SELF LEARNING COURSES for ADVANCED LEARNERS** SingleCellProteinCulture	-	2	II	40	60	100
	MOOC COURSES / International Certified online Courses (Department Specific Courses/any other courses) * Students can opt other than the listed course from UGC-SWAYAM UGC / CEC	-	Minimum 2 Credits	I – VI	-	-	

OFF CLASS PROGRAMMES

19UGVACZ1 - Value Added Certificate Course (Herbalism in Health Care)

21UGVACZ2 – Skill – Embedded Value Added Certificate Course (Lifestock Farming)

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OLD

2019

SEMESTER –V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5ME1	Biostatistics	Lecture	5	5

COURSE DESCRIPTION

This course deals with the application of statistical principles in biology.

COURSE OBJECTIVES

- To study the analysis and statistical significance of biological data.
- Interpret the results using different descriptive statistical methods.

UNIT - I COLLECTION & PROCESSING OF DATA (15 HRS.)

Introduction-Collection of data – primary & secondary, methods of data collection, methods of sampling-Classification of data- Types: geographical, chronological, qualitative & quantitative. Tabulation of data-parts of the table – methods of classification –Individual, Discrete and Continuous series.

UNIT – II MEASURES OF CENTRAL TENDENCY AND DISPERSION (15 HRS.)

Tabulation of data-Normalization of data-Analysis of data – Measures of central tendency & Measures of dispersion. Calculation of mean, mode, median, standard deviation, range, variance, coefficient of variance.

UNIT – III PRESENTATION OF DATA (15 HRS.)

Presentation of data – techniques of graphic presentation- line graph and histogram-Diagrammatic presentation- line diagram, bar diagram, pie diagram, pictogram and cartogram, Interpretation of data.

Self-Study-Diagrammatic presentation- line diagram, bar diagram, pie diagram, pictogram and cartogram, Interpretation of data.

UNIT - IV CORRELATION& REGRESSION (15 HRS.)

Correlation analysis - Kinds, Degree - Types of correlation- Pearson's Correlation Coefficient (Problems)-Regression analysis- Simple, Linear Regression (Problems) -Chi- Square Test – (Problems).

UNIT -V TEST OF VARIANCE (15 HRS.)

MS Excel – statistical functions- Test of Significance – Large and Small samples – ANOVA- one way and two way.

TEXT BOOK:

Ramakrishnan P., (2010). *Biostatistics*, Saras publications, Nagarcoil, Tamil Nadu.

REFERENCES:

1. Khan and Khanum., (2017). *Fundamentals & Biostatistics*, 2nd ed., Ukaaz Publications, Hyderabad.

2.Gurumani N., (2010) *An Introduction to Biostatistics*, MJP Publishers, Chennai.

3. Prasad S., (2012) *Elements of Biostatistics*, Rastogi publications, Meerut.

NEW

Total Change

Revised Syllabus

2021 - 2022

SEMESTER –V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5ME1	Biostatistics	Lecture	5	5

COURSE DESCRIPTION

This course deals with the application of statistical principles in biology.

COURSE OBJECTIVES

- To study the analysis and statistical significance of biological data.
- Interpret the results using different descriptive statistical methods.

UNIT - I COLLECTION & PROCESSING OF DATA (15 HRS.)

Introduction-Collection of data – primary & secondary, methods of data collection, methods of sampling-Classification of data- Types: geographical, chronological, qualitative & quantitative. Tabulation of data-parts of the table – methods of classification –Individual, Discrete and Continuous series.

UNIT – II MEASURES OF CENTRAL TENDENCY AND DISPERSION (15 HRS.)

Tabulation of data-Normalization of data-Analysis of data – Measures of central tendency & Measures of dispersion. Calculation of mean, mode, median, standard deviation, range, variance, coefficient of variance.

UNIT – III PRESENTATION OF DATA (15 HRS.)

Presentation of data – techniques of graphic presentation- line graph and

histogram-Diagrammatic presentation- line diagram, bar diagram, pie diagram, pictogram and cartogram, Interpretation of data.

Self-Study-Diagrammatic presentation- line diagram, bar diagram, pie diagram, pictogram and cartogram, Interpretation of data.

UNIT - IV CORRELATION& REGRESSION (15 HRS.)

Change – 1%

1%

Correlation analysis - Kinds, Degree - Types of correlation- Pearson's Correlation Coefficient (Problems)-Regression analysis- Simple, Linear Regression (Problems) -Chi- Square Test – goodness of fitness (Problems).

UNIT -V TEST OF VARIANCE (15 HRS.)

Change – 1%

1%

MS Excel – statistical functions- Test of Significance – Large and Small samples – (Students T test) - ANOVA- one way and two way.

TEXT BOOK:

Ramakrishnan P., (2010). *Biostatistics*, Saras publications, Nagarcoil, Tamil Nadu.

REFERENCES:

1. Khan and Khanum., (2017). *Fundamentals & Biostatistics*, 2nd ed., Ukaaz Publications, Hyderabad.

2.Gurumani N., (2010) *An Introduction to Biostatistics*, MJP Publishers, Chennai.

3. Prasad S., (2012) *Elements of Biostatistics*, Rastogi publications, Meerut.

Digital Open Educational Resources (DOER):

1. **https://www.oercommons.org/courses/chi-square-test-08-54**
2. **http://www.oercommons.org/courses/biostatistics-methods-2/view**

3. **https://www.oercommons.org/courses/anova-calculations**
4. **https://www.oercommons.org/authoring/21429-wp-12-1-additional-test-of-two-population-variance/view**
5. **https://vivaopen.oercommons.org/courseware/unit/420**

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT - 1 COLLECTION & PROCESSING OF DATA				
1.1	Introduction-Collection of data – primary & secondary data	2	Chalk & Talk	Black Board
1.2	Methods of data collection, Methods of sampling	3	Chalk & Talk	Black Board
1.3	Classification of data- Types: geographical, chronological, qualitative & quantitative.	4	Lecture	PPT & White board
1.4	Tabulation of data-parts of the table	2	Lecture	Black Board
1.5	Methods of classification – Individual, Discrete and Continuous series.	4	Lecture	Black Board
UNIT - 2 MEASURES OF CENTRAL TENDENCY AND DISPERSION				
2.1	Tabulation of data-Normalization of data-Analysis of data	2	Lecture	Black Board

2.2	Measures of central tendency & Measures of dispersion	3	Chalk & Talk	Black Board
2.3	Calculation of mean, mode, median	3	Chalk & Talk	Black Board
2.4	Standard deviation	2	Lecture	Black Board
2.5	Range, variance	3	Chalk & Talk	Black Board
2.6	Coefficient of variance	2	Lecture	Black Board
UNIT – 3 PRESENTATION OF DATA				
3.1	Presentation of data – techniques of graphic presentation- line graph and histogram	5	Chalk & Talk	Black Board
3.2	Diagrammatic presentation- line diagram, bar diagram, pie diagram, pictogram and cartogram	8	Chalk & Talk	Black Board
3.3	Interpretation of data	2	Lecture	Black board
UNIT - 4 CORRELATION & REGRESSION				
4.1	Correlation analysis Kinds, Degree - Types of correlation- Pearson's Correlation Coefficient (Problems)	8	Lecture	Black Board
4.2	Regression analysis- Simple, Linear Regression (Problems)	5	Chalk &Talk	Black Board
4.3	Chi- Square Test (goodness of fitness -Problems)	2	Chalk & Talk	Black Board
UNIT - 5 TEST OF VARIANCE				
5.1	MS Excel – statistical functions	4	Lecture	Black

				Board
5.2	Test of Significance – Large and Small samples (Student T test)	5	Chalk &Talk	Black Board
5.3	ANOVA- one way and two way	6	Chalk & Talk	Black Board

INTERNAL - UG

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Outline the importance of data collection and its types.	K1	PSO1
CO 2	Estimate and interpret the data, by various measures including mean, median, and standard deviation.	K3	PSO2
CO 3	Apply the basic numeric and graphical techniques to display and summarize the collected data.	K3	PSO8
CO 4	Interpret statistical results effectively in context to Correlation and Regression.	K2	PSO8
CO 5	Choose and apply appropriate statistical methods for analyzing one or two variables.	K2	PSO9

Mapping of COs with PSOs

CO/	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO	PSO

PSO	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	2	2	2	2	2	2	2	2	2	2
CO2	2	3	2	2	2	2	2	2	2	2	2	2
CO3	2	2	2	2	2	2	2	2	2	2	2	2
CO4	2	2	2	2	2	2	2	2	2	2	2	2
CO5	2	2	2	2	2	2	2	2	1	2	2	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	2	3	2	2
CO3	2	3	2	2
CO4	2	3	2	2
CO5	2	3	2	2

Note: □ Strongly Correlated – **3** □ Moderately Correlated – **2**

□ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. X. Devanya Rosaline

Forwarded By

Dr. A. TAMIL SELVI
Head, Dept. of Zoology
FATIMA COLLEGE (AUTONOMOUS)
MADURAI-625 018

HOD'S Signature & Name

FATIMA COLLEGE (Autonomous)
Affiliated to Madurai Kamaraj University
Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625 018, Tamil Nadu

OLD

2019

SEMESTER –V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5SB3	Ornamental Fish Culture	Lecture	2	2

COURSE DESCRIPTION

This course familiarizes the status and the importance of ornamental fish industry.

COURSE OBJECTIVES

- Enable the students to know about the characteristics of ornamental fishes and their development.
- Know about the diseases caused to them and their preventive measures.
- Motivate them to become an entrepreneur.

UNITS

UNIT –I INTRODUCTION TO AQUARIUM (6HRS.)

Introduction to Fish keeping and Scope of Ornamental Fish Culture - Types of Aquarium - Aquarium equipment - Setting up Aquarium.

Self-study –Scope of Ornamental Fish Culture

UNIT –II COMMERCIALLY IMPORTANT SPECIES (6 HRS.)

Species of Ornamental Fishes – Gold fish, Fighter, Guppies, swordtails, mollies; Marine – Angels, Parrot fish, Butterfly fishes, clown fish, anemone-

Aquarium Plants – Floating plants – Fairy moss, Indian Fern, Small eared *Salvinia* and Water lettuce; Submerged plants – Japanese Dwarf rust, Madagascar lace plant, *Hydrilla* and *Vallisneria*.

Self-study – Gold fish, Fighter, Guppies, swordtails, mollies

UNIT –III QUALITY MANAGEMENT (6 HRS.)

Water Quality Management - Fish Nutrition – Live feed- *Artemia, Tubifex* - Artificial feed.

UNIT –IV DEVELOPMENT AND PARENTAL CARE (6 HRS.)

Breeding and development of Aquarium fishes - Parental Care among Aquarium Fishes.

UNIT –V AQUARIUM DISEASES AND TREATMENT (6 HRS.)

Aquarium Fish Diseases – Bacterial- Red pest, Clumnaris, Dropsy, Scale protrusion, Tail Rot and Fin Rot Viral- Lymphocystis/Cauliflower disease Parasitic - Black spot disease, *Ergasilus*, *Uronema marinum*, Leeches.

TEXT BOOK:

1. Thara Devi, C.S and Jayashree, K.V., (2009) *Aquarium*. Saras Publication, Nagercoil,

REFERENCES:

1. Biswas, S.P., J.N. Das, U.K. Sarkar and Lakra, W.S., (2007) *Ornamental fishes of North East India*: An Atlas: NBFGR.
2. Spotte, S., (1993) *Marine Aquarium keeping*: The Sciences, Animals and Art, John Wiley & Sons, New York.
3. Jhingran,V.G., (1993) *Fish and Fisheries of India,* Hindustan publishing corporation, India,(1975).
4. Rath, A.K., (2011) *Freshwater Aquaculture*, Scientific publishers, Jodhpr, India.
5. Murthi.V.S. (2002) *Marine ornamental Fishes of Lakshadweep*, CMFRI, Special publication.

NEW

Revised Syllabus

Total Change 2%

2021 – 2022

III B.Sc. Zoology

SEMESTER –V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5SB3	Ornamental Fish Culture	Lecture	2	2

COURSE DESCRIPTION

This course familiarizes the status and the importance of ornamental fish industry.

COURSE OBJECTIVES

- Enable the students to know about the characteristics of ornamental fishes and their development.
- Know about the diseases caused to them and their preventive measures.
- Motivate them to become an entrepreneur.

UNITS

UNIT –I INTRODUCTION TO AQUARIUM (6HRS.)

Change - 2%

2%

Introduction to Fish keeping and Scope and entrepreneurial aspects of Ornamental Fish Culture - Types of Aquarium - Aquarium equipment - Setting up Aquarium. **Self-study – Scope of Ornamental Fish Culture**

UNIT –II COMMERCIALLY IMPORTANT SPECIES (6 HRS.)

Species of Ornamental Fishes – Gold fish, Fighter, Guppies, swordtails, mollies; Marine – Angels, Parrot fish, Butterfly fishes, clown fish, anemone- Aquarium Plants – Floating plants – Fairy moss, Indian Fern, Small eared *Salvinia* and Water lettuce; Submerged plants – Japanese Dwarf rust, Madagascar lace plant, *Hydrilla* and *Vallisneria*.

Self-study – Gold fish, Fighter, Guppies, swordtails, mollies

UNIT –III QUALITY MANAGEMENT (6 HRS.)

Water Quality Management - Fish Nutrition – Live feed- *Artemia, Tubifex* - Artificial feed.

UNIT –IV DEVELOPMENT AND PARENTAL CARE (6 HRS.)

Breeding and development of Aquarium fishes - Parental Care among Aquarium Fishes.

UNIT –V AQUARIUM DISEASES AND TREATMENT (6 HRS.)

Aquarium Fish Diseases – Bacterial- Red pest, Clumnaris, Dropsy, Scale protrusion, Tail Rot and Fin Rot Viral- Lymphocystis/Cauliflower disease Parasitic - Black spot disease, *Ergasilus*, *Uronema marinum*, Leeches.

TEXT BOOK:

2. Thara Devi, C.S and Jayashree, K.V., (2009) *Aquarium*. Saras Publication, Nagercoil,

REFERENCES:

6. Biswas, S.P., J.N. Das, U.K. Sarkar and Lakra, W.S., (2007) *Ornamental fishes of North East India*: An Atlas: NBFGR.
7. Spotte, S., (1993) *Marine Aquarium keeping*: The Sciences, Animals and Art, John Wiley & Sons, New York.
8. Jhingran,V.G., (1993) *Fish and Fisheries of India,* Hindustan publishing corporation, India,(1975).
9. Rath, A.K., (2011) *Freshwater Aquaculture*, Scientific publishers, Jodhpr, India.

10. Murthi.V.S. (2002) *Marine ornamental Fishes of Lakshadweep*, CMFRI, Special publication.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. 1https://mpeda.gov.in/?page_id=791
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4952235/
3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3435374/
4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3648355/
5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4203283/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO AQUARIUM				
1.1	Introduction to Fish keeping	1	Chalk & Talk	Black Board
1.2	Scope and entrepreneurial aspects of Ornamental Fish Culture	1	Discussion	
1.3	Types of Aquarium	1	Chalk & Talk	Black Board
1.4	Aquarium equipment	2	Chalk & Talk	Black Board
1.5	Setting up Aquarium	1	Chalk & Talk	Black Board
UNIT -2 COMMERCIALLY IMPORTANT SPECIES				
2.1	Species of Ornamental Fishes- Gold fish, Fighter, Guppies, swordtails, mollies. Marine – Angels, Parrot fish	1	Discussion	

2.2	Butterfly fishes, clown fish, anemone	1	Chalk & Talk	Black Board
2.3	Aquarium Plants – Floating plants – Fairy moss, Indian Fern	1	Chalk & Talk	PPT
2.4	Small eared *Salvinia* and Water lettuce	1	Chalk & Talk	Black Board
2.5	Submerged plants – Japanese Dwarf rust	1	Chalk & Talk	Black Board
2.6	Madagascar lace plant, *Hydrilla* and *Vallisneria*	1	Chalk & Talk	Black Board
UNIT -3 QUALITY MANAGEMENT				
3.1	Water Quality Management	2	Lecture	Black Board
3.2	Fish Nutrition	1	Chalk & Talk	Black Board
3.3	Live feed- *Artemia, Tubifex*	2	Chalk & Talk	Black Board
3.4	Artificial feed	1	Chalk & Talk	Black Board
UNIT – 4 DEVELOPMENT AND PARENTAL CARE				
4.1	Breeding and development of Aquarium fishes	3	Lecture	Black Board
4.2	Parental Care among Aquarium Fishes	3	Chalk & Talk	Black Board
UNIT – 5 AQUARIUM DISEASES AND TREATMENT				
5.1	Aquarium Fish Diseases – Bacterial- Red pest	1	Lecture	Black Board
5.2	Clumnaris, Dropsy, Scale protrusion, Tail Rot and Fin Rot	2	Chalk & Talk	Black Board
5.3	Viral- Lymphocystis/Cauliflower disease	1	Chalk & Talk	PPT
5.4	Parasitic - Black spot disease	1	Chalk &	Black

			Talk	Board
5.6	*Ergasilus*, *Uronema marinum*, Leeches	1	Chalk & Talk	PPT

INTERNAL - UG

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	35
Non Scholastic	5
	40

EVALUATION PATTERN

SCHOLASTIC	NON -	MARKS

					SCHOLASTIC			
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	List the types of aquarium.	K1	PSO9
CO 2	Plan the use of common aquarium ornamental fish and aquatic plants to decorate it.	K3	PSO9
CO 3	Outline the physico – chemical parameters of water required for the growth of fish.	K2	PSO2 & PSO9
CO 4	Explain the techniques followed in ornamental fish breeding.	K2	PSO4 & PSO9
CO 5	Identify the symptoms of various diseases prevalent in ornamental fish.	K3	PSO9

Mapping of COs with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12
CO1	2	2	2	2	2	2	2	2	3	2	2	2
CO2	2	2	2	2	2	2	2	2	3	2	2	2
CO3	2	2	2	2	2	2	2	2	3	2	2	2
CO4	2	2	2	2	2	2	2	2	3	2	2	2
CO5	2	2	2	2	2	2	2	2	3	2	2	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	2	2
CO2	2	2	2	2
CO3	2	2	3	2
CO4	3	2	2	2
CO5	2	2	2	2

Note: □ Strongly Correlated – **3** □ Moderately Correlated – **2**

□ Weakly Correlated -**1**

COURSE DESIGNER:
Dr. S. Barathy

Forwarded By

Dr. A. TAMIL SELVI
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MADURAI-625 018

HOD'S Signature & Name

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Re-Accredited with 'A++' (CGPA 3.61) by NAAC (Cycle - IV)
Mary Land, Madurai - 625 018, Tamil Nadu

OLD

2019

III B.Sc. Zoology

SEMESTER – V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5SB4	Sericulture	Lecture	2	2

COURSE DESCRIPTION

This course provides the knowledge of rearing of silkworm to produce raw silk.

COURSE OBJECTIVES

- Motivate young minds to become an entrepreneur for practicing sericulture as cottage industry.
- Gain knowledge about the diseases that affect silkworms.
- Know the steps involved in reeling process.

UNITS

UNIT –I INTRODUCTION TO SERICULTURE (6HRS.)

Scope of Sericulture– Silk route- Sericulture in India – Sericulture in Tamil Nadu -Role of Central Silk Board- Sericulture as Cottage industry - Biology of silkworm - Classification of Silkworm-Mulberry and Non mulberry.

Self-study – Scope of Sericulture – Sericulture in Tamil Nadu

UNIT – II MULBERRY CULTIVATION (6 HRS.)

Moriculture - varieties of mulberry - optimum conditions for mulberry growth - planting systems - Propagation: Vegetative - Seedling – Micropropagation - Biofertilizers - Triacontanol, Green manuring and Seriboost.

Self-study – Propagation: Vegetative

UNIT –III SILKWORM REARING (6 HRS.)

Life Cycle of mulberry Silkworm – Voltinism - Rearing of Silkworms - Rearing appliances - Rearing methods - Adult and Young rearing methods - types of mountage.

UNIT –IV REELING OPERATIONS (6 HRS.)

Steps involved in Reeling - cocoon stifling - storage and sorting of cocoons – deflossing - riddling boiling and brushing - reeling operations - Reeling appliances - charka, cottage basin and filature - Raw Silk - Visual and Mechanical tests - marketing.

UNIT –V SILKWORM DISEASES (6 HRS.)

Diseases of Silkworm – Protozoan diseases – Pebrine - Bacterial diseases: Bacterial Flacherie, Septicemia - Viral diseases: Viral Flacherie, Grasserie, Fungal diseases: Muscardine - Pest of silkworm- Uzifly, Dermestid Beetles

TEXT BOOKS:

1. Arumugam, N., Murugan, T., Rajeswar, J.J. &, R. (2015) *Applied Zoology*, R,Saras Publication, Kanyakumari.
2. Johnson, M & Kesary, M, (2008) *Sericulture*, CSI press, 4th Edition, Marthandam.

REFERENCES:

1. Krishnaswamy S. (1988) Sericulture Manual 1, 2 & 3, FAO Publications, New Delhi.
2. Reddy,S. G. (1994) *Silkworm Breeding*, Oxford & INH Publishing Co Pvt. Ltd., New Delhi.
3. Boraiah,G. (1994) *Lectures on Sericulture*, SBS Publishers distributors, Bangalore.
4. Ganga & Sulochana Chetty J.G. (2005) *An introduction to sericulture*, second edition, Oxford & IBH Publishing & Co. Pvt. Ltd., New Delhi.

NEW

Revised Syllabus

Total Change 5%

2021 – 2022

III B.Sc. Zoology

SEMESTER – V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5SB4	Sericulture	Lecture	2	2

COURSE DESCRIPTION

This course provides the knowledge of rearing of silkworm to produce raw silk.

COURSE OBJECTIVES

- Motivate young minds to become an entrepreneur for practicing sericulture as cottage industry.
- Gain knowledge about the diseases that affect silkworms.
- Know the steps involved in reeling process.

UNITS

UNIT –I INTRODUCTION TO SERICULTURE (6HRS.)

Change - 5%

5%

Scope of Sericulture– Silk route- Sericulture in India – Sericulture in Tamil Nadu -Role of Central Silk Board- National Sericulture Project (NSP) - Sericulture as Cottage industry - Biology of silkworm - Classification of Silkworm-Mulberry and Non mulberry.

Self-study – Scope of Sericulture – Sericulture in Tamil Nadu

UNIT – II MULBERRY CULTIVATION (6 HRS.)

Moriculture - varieties of mulberry - optimum conditions for mulberry growth - planting systems - Propagation: Vegetative - Seedling – Micropropagation -

Biofertilizers - Triacontanol, Green manuring and Seriboost.

Self-study – Propagation: Vegetative

UNIT –III SILKWORM REARING (6 HRS.)

Life Cycle of mulberry Silkworm – Voltinism - Rearing of Silkworms - Rearing appliances - Rearing methods - Adult and Young rearing methods - types of mountage.

UNIT –IV REELING OPERATIONS (6 HRS.)

Steps involved in Reeling - cocoon stifling - storage and sorting of cocoons – deflossing - riddling boiling and brushing - reeling operations - Reeling appliances - charka, cottage basin and filature - Raw Silk - Visual and Mechanical tests - marketing.

UNIT –V SILKWORM DISEASES (6 HRS.)

Diseases of Silkworm – Protozoan diseases – Pebrine - Bacterial diseases: Bacterial Flacherie, Septicemia - Viral diseases: Viral Flacherie, Grasserie, Fungal diseases: Muscardine - Pest of silkworm- Uzifly, Dermestid Beetles

TEXT BOOKS:

3. Arumugam, N., Murugan, T., Rajeswar, J.J. &, R. (2015) *Applied Zoology*, R,Saras Publication, Kanyakumari.
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1. Krishnaswamy S. (1988) Sericulture Manual 1, 2 & 3, FAO Publications, New Delhi.
2. Reddy,S. G. (1994) *Silkworm Breeding*, Oxford & INH Publishing Co Pvt. Ltd., New Delhi.
3. Boraiah,G. (1994) *Lectures on Sericulture*, SBS Publishers distributors, Bangalore.
4. Ganga & Sulochana Chetty J.G. (2005) *An introduction to sericulture*, second edition, Oxford & IBH Publishing & Co. Pvt. Ltd., New Delhi.

DIGITAL OPEN EDUCATIONAL RESOURCES

1.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5633739/

2.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC379057/

3. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7904692/

4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3115026/

5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4909305/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO SERICULTURE				
1.1	Scope of Sericulture – Silk route- Sericulture in India - Sericulture in Tamil Nadu	1	Chalk & Talk	Black Board
1.2	Role of Central Silk Board – National Sericulture Project (NSP)	1	Chalk & Talk	LCD
1.3	Sericulture as Cottage industry	1	Lecture	PPT
1.4	Biology of silkworm	2	Chalk & Talk	Black Board
1.5	Classification of Silkworm- Mulberry and Non mulberry	1	Chalk & Talk	Black Board
UNIT -2 MULBERRY CULTIVATION				
2.1	Moriculture - varieties of mulberry	1	Chalk & Talk	Black Board
2.2	optimum conditions for mulberry growth	1	Chalk & Talk	LCD
2.3	planting systems	1	Lecture	PPT
2.4	Propagation: Vegetative, Seedling and Micropropagation	2	Chalk & Talk	Black Board

2.5	Biofertilizers -Triacontanol, Green manuring and Seriboost	1	Chalk & Talk	Black Board
UNIT – 3 SILKWORM REARING				
3.1	Life Cycle of mulberry Silkworm, Voltinism	1	Chalk & Talk	Black Board
3.2	Rearing of Silkworms - Rearing appliances and Rearing methods	2	Chalk & Talk	LCD
3.3	Adult and Young rearing methods	2	Lecture	PPT
3.4	Types of mountage	1	Chalk & Talk	Black Board
UNIT – 4 REELING OPERATIONS				
4.1	Steps involved in Reeling - cocoon stifling	1	Chalk & Talk	Black Board
4.2	Storage and sorting of cocoons	1	Chalk & Talk	LCD
4.3	Deflossing, riddling boiling and brushing, reeling operations	2	Lecture	PPT
4.4	Reeling appliances- charka, cottage basin and filature	1	Chalk & Talk	Black Board
4.5	Raw Silk-Visual and Mechanical tests, marketing	1	Chalk & Talk	Black Board
UNIT -5 SILKWORM DISEASES				
5.1	Diseases of Silkworm – Protozoan diseases – Pebrine	1	Chalk & Talk	Black Board
5.2	Bacterial diseases: Bacterial Flacherie, Septicemia	1	Chalk & Talk	LCD
5.3	Viral diseases: Viral Flacherie, Grasserie	1	Lecture	PPT

5.4	Fungal diseases: Muscardine	1	Chalk & Talk	Black Board
5.5	Pest of silkworm- Uzifly, Dermestid Beetles	2	Chalk & Talk	Black Board

INTERNAL - UG

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC	NON - SCHOLASTIC	MARKS

C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	List the importance of sericulture as cottage industry and the support provided by Central Silk Board.	K1	PSO9
CO 2	Explain the different methods of vegetative propagation followed in mulberry cultivation.	K2	PSO6
CO 3	Outline the life cycle of mulberry silkworm and the methods of rearing.	K2	PSO1 & PSO9
CO 4	Organize the steps involved in processing of silk and its marketing.	K3	PSO9
CO 5	Find various diseases that affect silkworm and cocoon formation	K3	PSO9

Mapping of COs with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12
CO1	2	2	2	2	2	2	2	2	3	2	2	2
CO2	2	2	2	2	2	3	2	2	2	2	2	2
CO3	2	2	2	2	2	2	2	2	3	2	2	2

CO4	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**
CO5	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	2	2
CO2	3	2	2	2
CO3	2	2	2	2
CO4	2	2	3	2
CO5	3	2	2	2

Note: □ Strongly Correlated – **3** □ Moderately Correlated – **2** □ Weakly Correlated -**1**

COURSE DESIGNER:
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OLD

2019

III B.Sc. Zoology

SEMESTER –VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z6ME6	Entomology	Lecture	5	5

COURSE DESCRIPTION

This course provides knowledge about the interaction of insects with human and environment.

COURSE OBJECTIVES

- Understand about the classification, biology and control of insects.
- Appreciate the importance of beneficial insects.
- Acquire skills for collecting, mounting and preserving insects for scientific study.

UNITS

UNIT –I TAXONOMY (15HRS.)

Definition & outline classification of Class- Insecta - Salient features of some economically important insect orders: Thysanura, Orthoptera, Isoptera, Hemiptera, Coleoptera, Lepidoptera, Dermaptera, Odonata, Neuroptera and Hymenoptera - Collection of insects - methods - collecting equipment - mounting – preservation andidentification of insects.

Self-study – Mounting and preservation

UNIT –II MORPHOLOGY AND METAMORPHOSIS (15 HRS.)

General structural organization of insects: head, compound eyes, antennae, mouthparts; thorax- legs, wings; abdomen – nongenital & genital abdominal appendages. Brief account on metamorphosis, moulting, diapause.Brief account on special glands of insects-wax gland, silk gland and pheromone gland.Bioluminescence.

Self-study – mouthparts, metamorphosis, moulting and silk gland

UNIT –III BENEFICIAL INSECTS (15 HRS.)

Beneficial aspects of insects-role of insects as pollinators of crops-insects as bio agents in control of crop pests - insects as suppliers of useful products-honey, propolis, royal jelly, bee wax, silk, natural dye, insect galls, cantharidin.

UNIT –IV HARMFUL INSECTS (15 HRS.)

Pests-definition, kinds of pests - Brief account & control measures of the following pests: -

Household insect pests- Cockroach & silver fish, medically important insects-*Anopheles*, *Culex*, *Aedes*, sand flies, black flies- insects injurious to livestock-Horse flies, Warble flies.

UNIT –V INSECT PEST OF AGRICULTURAL CROPS (15 HRS.)

Pests of crops - brief account on pink cotton boll worm, paddy stem borers, red hairy caterpillar & Rhinoceros Beetle - Pests of stored grains - Rice Weevil, grain moth, Rice moth, flour beetle, Khapra beetle, pulse beetle, management of insect pests of stored food grains - prevention & curative measures, brief account on Integrated Pest Management - Chemical, Biological methods of control.

TEXT BOOK:

1. Singh R. and Sachan G. C (2012) *Elements of entomology*, Rastogi Publications, Meerut, India.

REFERENCES:

1. Vasantharaj D and Kumaraswami, D., (1998) *Elements of Economic entomology*, Popular book depot, Chennai.
2. Romosa W.S and Stoffolano J.G., (1998) *The science of entomology*, Mc Grow-Hill Company, New York.
3. Pedigo LIP, (2002) E*ntomology and pest management*, Pearson Education, Singapore.

NEW

Revised Syllabus

Total Change 5%

2021 – 2022

III B.Sc. Zoology

SEMESTER –VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z6ME6	Entomology	Lecture	5	5

COURSE DESCRIPTION

This course provides knowledge about the interaction of insects with human and environment.

COURSE OBJECTIVES

- Understand about the classification, biology and control of insects.
- Appreciate the importance of beneficial insects.
- Acquire skills for collecting, mounting and preserving insects for scientific study.

UNITS

UNIT –I TAXONOMY (15HRS.)

Definition & outline classification of Class- Insecta upto orders - Salient features of some economically important insect orders: Thysanura, Orthoptera, Isoptera, Hemiptera, Coleoptera, Lepidoptera, Dermaptera, Odonata, Neuroptera and Hymenoptera - Collection of insects - methods - collecting equipment - mounting - preservation.

Self-study – Mounting and preservation

UNIT –II MORPHOLOGY AND METAMORPHOSIS (15 HRS.)

General structural organization of insects: head, compound eyes, antennae, mouthparts; thorax- legs, wings; abdomen – nongenital & genital abdominal appendages. Brief account on metamorphosis, moulting, diapause.Brief account on special glands of insects-wax gland, silk gland and pheromone gland.Bioluminescence.

Self-study – mouthparts, metamorphosis, moulting and silk gland

UNIT –III BENEFICIAL INSECTS (15 HRS.)

Change – 5%

5%

Beneficial aspects of insects-role of insects as pollinators of crops-insects as bio agents in control of crop pests - insects as suppliers of useful products-honey, propolis, royal jelly, bee wax, silk, natural dye, insect galls, cantharidin - Lac insect: culture - harvesting.

UNIT –IV HARMFUL INSECTS (15 HRS.)

Pests-definition, kinds of pests - Brief account & control measures of the following pests: -

Household insect pests- Cockroach & silver fish, medically important insects- *Anopheles*, *Culex*, *Aedes*, sand flies, black flies- insects injurious to livestock- Horse flies, Warble flies.

UNIT –V INSECT PEST OF AGRICULTURAL CROPS (15 HRS.)

Pests of crops - brief account on pink cotton boll worm, paddy stem borers,

red hairy caterpillar & Rhinoceros Beetle - Pests of stored grains - Rice Weevil, grain moth, Rice moth, flour beetle, Khapra beetle, pulse beetle, management of insect pests of stored food grains - prevention & curative measures, brief account on Integrated Pest Management - Chemical, Biological methods of control.

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5. Romosa W.S and Stoffolano J.G., (1998) *The science of entomology*, Mc Grow-Hill Company, New York.
6. Pedigo LIP, (2002) E*ntomology and pest management*, Pearson Education, Singapore.

DIGITAL OPEN EDUCATIONAL RESOURCES (DOER)

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4541473/
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6628405/
3. https://www.nature.com/articles/501S15a
4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6391707/
5. https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7164

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 TAXONOMY				
1.1	Definition & outline classification of Class- Insecta up to orders	3	Chalk & Talk	Black Board
1.2	Salient feature of some economically important insect	3	Chalk & Talk	LCD

	orders Thysanura, Orthoptera, Isoptera,			
1.3	Hemiptera, Coleoptera, Lepidoptera	2	Lecture	PPT
1.4	Dermaptera, Odonata, Neuroptera and Hymenoptera	2	Lecture	Black Board
1.5	Collection of insects- methods and collecting equipment	2	Lecture	Black Board
1.6	Mounting and preservation	1	Discussion	
UNIT -2 MORPHOLOGY AND METAMORPHOSIS				
2.1	General structural organization of insects-head	3	Lecture	Green Board Charts
2.2	compound eyes, antennae, Mouth parts	2	Chalk & Talk	Green Board
2.3	thorax-legs, wings; abdomen – nongenital & genital abdominal appendages	3	Chalk & Talk	Black Board
2.4	Brief account on metamorphosis, moulting, Diapause	2	Chalk & Talk	LCD
2.5	Brief account on special glands of insects-wax gland and silk gland	2	Lecture	PPT
2.6	pheromone gland. Bioluminescence	3	Chalk & Talk	LCD
UNIT -3 BENEFICIAL INSECTS				
3.1	Beneficial aspects of insects-role of insects as pollinators of crops	3	Chalk & Talk	Black Board
3.2	insects as bio agents in control of crop pests	3	Chalk & Talk	LCD

3.3	insects as suppliers of useful products-honey	2	Lecture	PPT
3.4	propolis, royal jelly, bee wax	2	Lecture	Black Board
3.5	silk, natural dye, insect galls, cantharidin	2	Lecture	Black Board
3.6	Lac insect: culture - harvesting	3	Lecture	Black Board
UNIT -4 HARMFUL INSECTS				
4.1	Pests-definition, kinds of pests	2	Chalk & Talk	Black Board
4.2	Brief account & control measures of the following pests: -Household insect pests Cockroach	3	Chalk & Talk	LCD
4.3	silver fish	2	Lecture	PPT
4.4	medically important insects-*Anopheles*	2	Lecture	Black Board
4.5	*Culex*, *Aedes*, sand flies and black flies	3	Lecture	Black Board
4.6	Insects injurious to livestock-Horse flies, Warble flies	3	Chalk & Talk	Black Board
UNIT -5 INSECT PEST OF AGRICULTURAL CROPS				
5.1	Pests of crops-brief account on pink cotton boll worm	2	Chalk & Talk	Black Board
5.2	paddy stem borers, red hairy caterpillar	2	Chalk & Talk	LCD
5.3	Rhinoceros Beetle	2	Lecture	PPT
5.4	Pests of stored grains-Rice Weevil, grain moth	2	Lecture	Black Board
5.5	Rice moth, flour beetle, Khapra beetle, pulse beetle	2	Lecture	Black Board

5.6	Management of insect pests of stored food grains-prevention &curative measures	2	Chalk & Talk	Black Board
5.7	Brief account on Integrated Pest Management-Chemical, Biological methods of control	3	Chalk & Talk	LCD

INTERNAL - UG

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC	NON - SCHOLASTIC	MARKS

C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	List the different methods of insect collection.	K1	PSO1
CO 2	Find the morphological modifications of insects with different functions.	K3	PSO1
CO 3	Summarize the beneficial aspects of insects.Lect	K2	PSO1
CO 4	Explain the harmful effects of insects.	K2	PSO1
CO 5	Identify the agricultural pests and the economic damage caused.	K3	PSO6

Mapping of COs with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12

CO1	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO2	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO3	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO4	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO5	**2**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	**3**	**2**	**2**	**2**
CO2	**3**	**2**	**2**	**2**
CO3	**3**	**2**	**2**	**2**
CO4	**3**	**2**	**2**	**2**
CO5	**2**	**2**	**3**	**2**

Note: □ Strongly Correlated – **3** □ Moderately Correlated – **2**

□ Weakly Correlated -**1**

COURSE DESIGNER:

1. Dr. S. BarathyForwarded By

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Mary Land, Madurai - 625 018, Tamil Nadu

OLD

2019

III B.Sc. Zoology

SEMESTER – VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UAZO	19Z6CC20	Lab - Biotechnology	Practical	3	2

COURSE DESCRIPTION

Students gain hands-on experience and learn the theoretical basis of lab techniques common to a variety of biological disciplines such as biotechnology, Bioinformatics and Entomology and they will work in groups, learning how to collect, analyze, and present data while using the scientific method to conduct inquiry-based laboratory experiments.

COURSE OBJECTIVES

- Introductory laboratory course in current principles and techniques applicable to research problems in biotechnology, Bioinformatics and Entomology
- Learners can identify insects and able to group them into different taxa
- Learners gain knowledge handling biological database and retrieve

information

UNITS

UNIT – I BIOTECHNOLOGY

1. Laboratory biosafety guidelines
2. Isolation of protein from spinach leaves
3. Estimation of Total soluble proteins using Bradford method
4. Electrophoretic separation proteins
5. Isolation of genomic DNA from goat liver/Bacteria.
6. Isolation of Plasmid DNA by alkaline lysis method.
7. Electrophoretic separation of DNA.
8. Demonstration of PCR.
9. Spotters: Agarose gel electrophoresis, SDS-PAGE, pBR322, Spirulina and Insulin

UNIT-II ENTOMOLOGY

1. Collection and Preservation of Insects.

2. Spotters: Mouth parts of Cockroach & Honey bee; Life Cycle of Holometabolous and Hemimetabolous Insects, Pests of Agricultural Importance – Rice Weevil, Rhinoceros Beetle.

UNIT- III BIOINFORMATICS

1. Sequence retrieval from GenBank

2. Pairwise alignment - BLAST

3. Molecular visualization of Proteins

REFERENCE BOOKS:

1. Rajan S., Christy, S.R., (2011) Experimental procedures in Life Sciences, Anjana Book House, Chennai.

2. Sinha J., Chatterjee A.K., Chattopadhyay P., (2015) Advanced Practical Zoology, Books and Allied (P) Ltd., Calcutta.

3. Tembhare D.B., (2008) Techniques in Life Sciences, 1st ed., Himalaya Publishing House

NEW

Revised Syllabus

Total Change 5%

2021 – 2022

III B.Sc. Zoology

SEMESTER – VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UAZO	19Z6CC20	Lab - Biotechnology	Practical	3	2

COURSE DESCRIPTION

Students gain hands-on experience and learn the theoretical basis of lab techniques common to a variety of biological disciplines such as biotechnology, Bioinformatics and Entomology and they will work in groups, learning how to collect, analyze, and present data while using the scientific method to conduct inquiry-based laboratory experiments.

COURSE OBJECTIVES

- Introductory laboratory course in current principles and techniques applicable to research problems in biotechnology, Bioinformatics and Entomology
- Learners can identify insects and able to group them into different taxa
- Learners gain knowledge handling biological database and retrieve

information

UNITS

UNIT – I BIOTECHNOLOGY

1. Laboratory biosafety guidelines
2. Isolation of protein from spinach leaves
3. Estimation of Total soluble proteins using Bradford method
4. Electrophoretic separation proteins
5. Isolation of genomic DNA from goat liver/Bacteria.
6. Isolation of Plasmid DNA by alkaline lysis method.
7. Electrophoretic separation of DNA.
8. Demonstration of PCR.
9. Spotters: Agarose gel electrophoresis, SDS-PAGE, pBR322, Spirulina and Insulin

UNIT-II ENTOMOLOGY

Change – 3%

3%

1. Collection and Preservation of Insects.

2. Spotters: Mouth parts of Cockroach & Honey bee; Life Cycle of Holometabolous (Butterfly) and Hemimetabolous Insects (Cockroach), Pests of Agricultural Importance – Rice Weevil, Rhinoceros Beetle.

UNIT- III BIOINFORMATICS

Change – 2%

2%

1. Sequence retrieval from GenBank

2. Pairwise alignment - BLAST

3. Molecular visualization of Proteins- RASMOL

REFERENCE BOOKS:

1. Rajan S., Christy, S.R., (2011) Experimental procedures in Life Sciences, Anjana Book House, Chennai.

2. Sinha J., Chatterjee A.K., Chattopadhyay P., (2015) Advanced Practical Zoology, Books and Allied (P) Ltd., Calcutta.
3. Tembhare D.B., (2008) Techniques in Life Sciences, 1st ed., Himalaya Publishing House

DIGITAL OPEN EDUCATIONAL RESOURCES

1. https://www.oercommons.org/courseware/lesson/15022/overview
2. https://www.oercommons.org/authoring/8657-biotechnology-resources/4/view
3. https://www.wileyindia.com/practical-biotechnology-principles-and-protocols.html
4. https://www.researchgate.net/publication/303997580_Principles_of_Biotechnology-Practical_Manual
5. https://www.apsnet.org/edcenter/disimpactmngmnt/labexercises/PlantBiotechnology/Pages/Activity5.aspx

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
BIOTECHNOLOGY				
1.1	Laboratory biosafety guidelines	3	PPT & Discussion	LCD
1.2	Isolation of protein from spinach leaves	3	Hands on training	Chemicals,Glass wares & Instruments
1.3	Estimation of Total soluble proteins using Bradford method	3	Hands on training	Chemicals,Glass wares & Instruments
1.4	Electrophoretic separation proteins	3	Demonstration	Chemicals,Glass wares & Instruments

1.5	Isolation of genomic DNA from goat liver.	3	Hands on training	Chemicals,Glass wares & Instruments
1.6	Isolation of Plasmid DNA by alkaline lysis method	3	Hands on training	Chemicals,Glass wares & Instruments
1.7	Electrophoretic separation of DNA	3	Hands on training	Chemicals,Glass wares & Instruments
1.8	Demonstration of PCR	3	Demonstration	Chemicals,Glass wares & Instruments
1.9	Spotters: Agarose gel electrophoresis, SDS-PAGE, pBR322, Spirulina and Insulin	3	Demonstration	Specimens, Models,Print-Outs,Bio-Visula Charts
ENTOMOLOGY				
2.1	Collection and Preservation of Insects.	3	Demonstration	Model and specimens
2.2	Spotters: Mouth parts of Cockroach & Honey bee;	3	Demonstration & Hands on training	Glass Slide,Microscope and chemicals etc.,
2.3	Spotters: Life Cycle of Holometabolous (Butterfly)and Hemimetabolous Insects (Cockroach)	3	Demonstration	Bio-Visual Charts,LCD
2.4	Spotters: Pests of Agricultural Importance – Rice Weevil, Rhinoceros Beetle.	3	Demonstration	Specimens, Models, Preserved Insect Box

BIOINFORMATICS				
3.1	Sequence retrieval from GenBank	3	Demonstration & Hands on training	LCD
3.2	Pairwise alignment - BLAST	3	Demonstration & Hands on training	LCD
3.3	Molecular visualization of Proteins- RASMOL	3	Demonstration & Hands on training	LCD

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

MARKS		
CIA	**ESE**	**Total**
40	**60**	**100**

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S	PSOs ADDRESSED

		TAXONOMY)	
CO 1	Acquire skills in handling basic equipments	**K1**	PSO1, PSO2, & PSO7
CO 2	Identify the insects	**K1**	PSO1, PSO2 & PSO4
CO 3	Estimate the various biomolecules using standard protocols	**K3**	PSO1, PSO2 & PSO7
CO 4	Identify and comment on the spotters Agarose gel electrophoresis, SDS-PAGE, pBR322, Spirulina and Insulin and Bioinformatics tools	**K3**	PSO1, PSO2 PSO8 & PSO10
CO 5	Examine the features in mouth parts of Cockroach & Honey bee, Pests of Agricultural Importance – Rice Weevil, Rhinoceros Beetle	**K4**	PSO1 & PSO 4

Mapping of COs with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO1 0	PSO1 1	PSO1 2
CO1	3	3	2	2	2	2	3	2	2	2	2	2
CO2	3	2	2	3	2	2	2	2	2	2	2	2
CO3	3	3	2	2	2	2	3	2	2	2	2	2
CO4	3	3	2	2	2	2	2	2	2	3	2	2
CO5	3	2	2	3	2	2	2	2	2	2	2	2

Mapping of COs with POs

CO/ PSO	PO 1	PO 2	PO 3	PO 4
CO 1	3	2	3	2
CO 2	3	2	2	2
CO 3	3	2	3	2
CO 4	3	2	3	2
CO 5	3	2	2	2

Note: □ **Strongly Correlated – 3** □ **Moderately Correlated – 2**
□ **Weakly Correlated -1**

COURSE DESIGNER:

Dr. N. Malathi

Forwarded By

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OLD

2019

III B.Sc. Zoology

SEMESTER – VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z6SB6	Dairy Farming	Lecture	2	2

COURSE DESCRIPTION

This course provides comprehensive knowledge on the breeds of Dairy animals, their management. The course also introduces the method of preparation and nutritional value of various Dairy products for the benefit of mankind.

COURSE OBJECTIVES

- Interpret the management of high yielding dairy species
- Prepare value added products using milk
- Manage Livestock diseases in Animal Husbandry
- Become an entrepreneur

UNITS

UNIT I: INTRODUCTION [6 HRS]

Introduction and Scope of dairy farming. Dairy animals- Dairy Cows: Indigenous- Red Sindhi, Sahiwal and Gir, Exotic- Jersy and Holstein Friesian. Buffaloes- Murrah and Surti, Cloning of Cows.

Self Study - Scope of dairy farming

UNIT II: MANAGEMENT OF DAIRY BARN [6 HRS]

Brief account on Dairy house. Stages of Management of Dairy Cows: Management of new born calf, Management of Heifer, Management of Milking cow - Feeding and breeding management.

Self Study - Brief account on Dairy house

UNIT III: STERILIZATION OF MILK [6 HRS]

Composition and Nutritive value of Milk, Milking machine. Pasteurization - Methods of Pasteurization and advantages. Detection of adulteration of Milk- Lactometer- Methylene Blue Reductase test (MBR) -Sulphuric acid method.

Self Study - Nutritive value of Milk

UNIT IV:MILK PRODUCTS [6 HRS]

Brief account on milk products: Whole milk powder, Skim milk powder, Homogenized milk, Standardized milk and Toned milk, Panir, Rabri, Khoa and Ice cream. Fermented milk products: Kefir, Koumiss, Dahi, Butter milk, Desi butter and Ghee. Cheese: Types-preparation- spoilage of Cheese and Whey.

Self Study - Ice cream

UNIT V: LIVESTOCK DISEASES [6 HRS]

Livestock diseases: Etiology, Mode of transmission, Clinical findings and Control measures of Mastitis, Rinder pest (Cattle Plague-Bovine typhus) and Foot and mouth disease.

Self Study - Rinder pest

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only) (HRS.)

REFERENCES:

TEXT BOOK:

1. Arumugam N, Murugan T, Johnson Rajeswar J and Ram Prabu,R. (2015).*Economic Zoology*.SarasPublication, Kanyakumari.

REFERENCE BOOKS:

1. Uma Shankar Singh. (2008). *Dairy Farming*. Anmol Publications, New Delhi.

2. Banerjee, G.C. (2012). *A Text Book of Animal Husbandry*. Oxford &IBH Publication, New Delhi.
3. ICAR. (2000). *Hand book of Animal Husbandry*. The Indian Council for Agricultural Research, New Delhi.

Revised Syllabus

Total Change 2%

2021 – 2022

III B.Sc. Zoology

SEMESTER – VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z6SB6	Dairy Farming	Lecture	2	2

COURSE DESCRIPTION

This course provides comprehensive knowledge on the breeds of Dairy animals, their management. The course also introduces the method of preparation and nutritional value of various Dairy products for the benefit of mankind.

COURSE OBJECTIVES

- Interpret the management of high yielding dairy species
- Prepare value added products using milk
- Manage Livestock diseases in Animal Husbandry
- Become an entrepreneur

UNITS

UNIT I: INTRODUCTION [6 HRS]

Change – 2%

2%

Introduction and Scope of dairy farming. Dairy animals- Dairy Cows: Indigenous- Red Sindhi, Sahiwal and Gir, Exotic- Jersy and Holstein Friesian. Buffaloes- Murrah and Surti, Brief account on the significance of indigenous cow breeds.

Self Study - Scope of dairy farming

UNIT II: MANAGEMENT OF DAIRY BARN [6 HRS]

Brief account on Dairy house. Stages of Management of Dairy Cows: Management of new born calf, Management of Heifer, Management of Milking cow - Feeding and breeding management.

Self Study - Brief account on Dairy house

UNIT III: STERILIZATION OF MILK [6 HRS]

Composition and Nutritive value of Milk, Milking machine. Pasteurization - Methods of Pasteurization and advantages. Detection of adulteration of Milk- Lactometer- Methylene Blue Reductase test (MBR) -Sulphuric acid method.

Self Study - Nutritive value of Milk

UNIT IV:MILK PRODUCTS [6 HRS]

Brief account on milk products: Whole milk powder, Skim milk powder, Homogenized milk, Standardized milk and Toned milk, Panir, Rabri, Khoa and Ice cream. Fermented milk products: Kefir, Koumiss, Dahi, Butter milk, Desi butter and Ghee. Cheese: Types-preparation- spoilage of Cheese and Whey.

Self Study - Ice cream

UNIT V: LIVESTOCK DISEASES [6 HRS]

Livestock diseases: Etiology, Mode of transmission, Clinical findings and Control measures of Mastitis, Rinder pest (Cattle Plague-Bovine typhus) and Foot and mouth disease.

Self Study - Rinder pest

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only) (HRS.)

REFERENCES:

TEXT BOOK:

1. Arumugam N, Murugan T, Johnson Rajeswar J and Ram Prabu,R. (2015).*Economic Zoology*.SarasPublication, Kanyakumari.

REFERENCE BOOKS:

4. Uma Shankar Singh. (2008). *Dairy Farming*. Anmol Publications, New Delhi.

5. Banerjee, G.C. (2012). *A Text Book of Animal Husbandry*. Oxford &IBH Publication, New Delhi.
6. ICAR. (2000). *Hand book of Animal Husbandry*. The Indian Council for Agricultural Research, New Delhi.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. https://toolkit.climate.gov/case-studies/precise-soil-climate-and-weather-data-help-dairy-optimize-water-use
2. https://www.oerafrica.org/resource/farm-milk-production-marketing-and-processing-activities-kiruhura-district-situational

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	Introduction to dairy farming	1	Chalk & Talk	Black Board
1.2	Scope of dairy farming	1	Discussion	Google classroom
1.3	Dairy animals- Dairy Cows: Indigenous- Red Sindhi, Sahiwal and Gir	1	Lecture	PPT
1.4	Exotic- Jersy and Holstein Friesian	1	Lecture	PPT& Video
1.5	Buffaloes- Murrah and Surti	1	Lecture	PPT& Video
1.6	Cloning of Cow	1	Chalk & Talk	Black Board
UNIT -2 MANAGEMENT OF DAIRY BARN				
2.1	Brief account on Dairy house	1	Lecture	LCD & Video

2.2	Stages of Management of Dairy Cows: Management of new born calf	2	Lecture	LCD
2.3	Stages of Management of Dairy Cows: Management of Heifer	1	Lecture	LCD
2.4	Stages of Management of Dairy Cows: Management of Milking cow	2	Lecture	LCD
UNIT -3 STERILIZATIONOFMILK				
3.1	Composition and Nutritive value of Milk	1	Lecture	PPT
3.2	Milking machine	1	Lecture	LCD & Video
3.3	Pasteurization - Methods of Pasteurization and advantages	2	Chalk & Talk	Black Board
3.4	Detection of adulteration of Milk- Lactometer	1	Chalk & Talk	Black Board
3.5	Detection of adulteration of Milk- - Methylene Blue Reductase test (MBR) -Sulphuric acid method.	1	Chalk & Talk	Black Board
UNIT - 4 MILK PRODUCTS				
4.1	Milk products: Whole milk powder, Skim milk powder, Homogenized milk, Standardized milk and Toned milk	2	Lecture	LCD
4.2	Panir, Rabri, Khoa and Ice cream	1	Lecture	LCD
4.3	Fermented milk products: Kefir, Koumiss, Dahi, Butter milk, Desi butter and Ghee	2	Lecture	LCD
4.4	Cheese: Types-preparation-spoilage of Cheese and Whey	1	Lecture	PPT &White Board

UNIT -5 LIVESTOCK DISEASES				
5.1	Livestock diseases: Introduction	1	Chalk & Talk	Black Board
5.2	Etiology, Mode of transmission, Clinical findings and Control measures of Mastitis	2	Lecture	LCD
5.3	Etiology, Mode of transmission, Clinical findings and Control measures of Rinder pest (Cattle Plague-Bovine typhus)	1	Discussion	Google classroom
5.4	Etiology, Mode of transmission, Clinical findings and Control measures of Foot and mouth disease	2	Lecture	LCD

INTERNAL - UG

Levels	C1	C2	C3	C4	C5	Total Scholastic Marks	Non Scholastic Marks C6	CIA Total	% of Assessment
	T1 10 Mks.	T2 10 Mks.	Quiz 5 Mks.	Assignment 5 Mks	OBT/PPT 5 Mks	35 Mks.	5 Mks.	40Mks.	
K1	2	2	-	-	-	4	-	4	10 %
K2	2	2	5	-	-	9	-	9	22.5 %
K3	3	3	-	-	5	11	-	11	27.5 %
K4	3	3	-	5	-	11	-	11	27.5 %
Non Scholastic	-	-	-	-	-		5	5	12.5 %
Total	10	10	5	5	5	35	5	40	100 %

CIA	
Scholastic	**35**
Non Scholastic	**5**
	40

EVALUATION PATTERN

SCHOLASTIC					NON - SCHOLASTIC	MARKS		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the features of various indigenous and exotic breeds of dairy cattles.	**K3**	PSO1, PSO3, PSO4, PSO6 & PSO9
CO 2	Discuss the management of new born calf, Heifer and milk cow.	**K2**	PSO1, PSO2 PSO3, PSO4 PSO6, & PSO9
CO 3	Summarize the significance of Pasteurization in the preservation of the nutritive value of milk.	**K1**	PSO1, PSO2 PSO3, PSO4 PSO8, PSO9 &PSO11
CO 4	Develop an idea regarding the formulation of value added dairy products.	**K3**	PSO1, PSO2 PSO4, PSO6 PSO9 & PSO11
CO 5	Describe the clinical findings, treatment and control measures of livestock diseases.	**K2**	PSO1, PSO2 PSO3, PSO4 PSO6, PSO8 & PSO9

Mapping of COs with PSOs

CO/ PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO1 0	PSO 11	PSO1 2
CO1	3	-	3	3	2	3	2	2	3	2	2	2
CO2	3	3	3	3	2	2	2	2	3	2	2	2
CO3	3	3	3	3	2	2	2	2	3	2	3	2
CO4	3	2	-	3	2	2	2	2	3	2	3	2
CO5	3	3	2	3	2	2	2	2	3	2	2	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	3	2	2
CO2	3	3	3	2
CO3	3	3	3	2
CO4	3	3	3	2
CO5	3	3	3	2

Note: □ Strongly Correlated – **3** □ Moderately Correlated – **2** □ Weakly Correlated -**1**

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