FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with A^{++} Grade by NAAC (IV Cycle)

Maryland, Madurai- 625 018, Tamil Nadu, India

REVISED SYLLABUS

NAME OF THE DEPARTMENT: ZOOLOGY

NAME OF THE PROGRAMME: B. Sc

PROGRAMME CODE: UAZO

ACADEMIC YEAR: 2023 - 2024

FATIMA COLLEGE (Autonomous), MADURAI – 625018

MINUTES OF THE BOARD OF STUDIES

NAME OF THE DEPARTMENT: B.Sc ZOOLOGY

TO BE IMPLEMENTED FROM: 2023 - 2024 ONWARDS

VENUE: Department of Zoology

CONVENED ON: 05.04.2023 CONVENED AT: 02.00pm

MEMBERS PRESENT

1. Dr. A. Tamil Selvi	Head of the Department 05/04/2023
2. Dr. V. Shanmugaiah Assistant Professor Department of Microbial Technology School of Biological Sciences Madurai Kamaraj University Madurai – 625 021	University Nominee 5/4/23
3. Dr. P. J. Joslin Associate Professor PG & Research Department of Zoology St. Mary's College (Autonomous) Thoothukudi – 628 001	Subject Expert P. J. Joslin 5/4/2023
4. Dr. R. Uma Maheswari Assistant Professor PG Department of Zoology Arulmigu Palaniandavar Arts College for Women Palani – 624 615	Subject Expert 5/4/23

5. Dr. A. Vanniarajan Scientist Aravind Medical Research Foundation Madurai – 625020	Industrialist / Scientist A. Vanniarajan 05/04/23
6. Miss. S. Susaritha Research Scholar PG & Research Department of Zoology The American College Madurai – 625 020	Alumna S. Susaritha 05.04.2
7. Dr. A. Rajeswari	Dean of Academic Affairs 05/4/23
8. Dr. Antony Amala Jayaseeli	Staff Member 05/04/22
9. Dr. N. Malathi	Staff Member 5/4/2023
10. Dr. J. Asnet Mary	Staff Member 5/4/2023
11. Dr. V. Bharathy	Staff Member 5/4/23
12. Dr. N. Nagarani	Staff Member 5/4/23
13. Dr. S. Barathy	Staff Member 5/4/23
14. Mrs. J. Thelma	Staff Member 5/4/23
15. Mrs. D. Kayathri	Staff Member 5/4/23

MINUTES OF THE BOARD OF STUDIES:

1. PRESENTATION OF THE ACTION TAKEN REPORT

ACTION TAKEN REPORT FOR 2022-2023

S. NO	COMMON SUGGESTIONS OFFERED IN THE PREVIOUS BOARD	ACTION TAKEN FOR THE ACADEMIC YEAR 2022-23
1.	Hands-on training may be provided to the Students whenever possible.	Hands-on training is given to the students in all possible ways.
2.	Biostatistics problems can be given using real-time data collected from the field.	Field data is used for Biostatistical analysis.

CHANGE OF COURSE TITLE

S. NO	OLD COURSE CODE	NEW COURSE CODE	OLD COURSE CODE	NEW COURSE TITLE	NEED FOR CHANGE
–	–	NIL	–	–	–

NEW COURSES INTRODUCED

S. NO	COURSE CODE	COURSE TITLE	RELEVANCE TO				SCOPE FOR			NEED FOR INTRODUCTION
			L	R	N	G	EMP	ENT	SD	
1.	22Z6SB6	Poultry Farming	L	R	N	G	EMP	ENT	SD	To enhance the entrepreneurial aspects of the Programme
2.	21Z4SLN1	Public Health & Hygiene	L	R	N	G	EMP	–	SD	Offered to the advanced learners

REVISED COURSES

S. NO	COURSE CODE & COURSE TITLE	UNIT NO & REVISED CONTENT	% of Revision	NEED FOR REVISION	RELEVANCE TO L	R	N	G	SCOPE FOR EMP	EN	SD
1.	19Z4CC10 Microbiology	The Following topics are included -UNIT-II -Bacteria-autotrophic & heterotrophic nutrition, aerobic & anaerobic respiration, Beneficial & harmful role of bacteria. UNIT-III viruses -Lytic & Lysogenic cycle, Transmission of viruses in plants, animals & man.	10 %	As per the guidelines of academic Deans & recommen -dation of course teachers	-	-	N	G	EMP	-	SD
2.	19Z4SB2 mushroom Cultivation	The following topic are included in Unit-III cultivation of techniques compost - materials for compost preparation - methods of composting characteristics of compost - spawning - methods, Types, Storage - Spawn running	10 %	Guidelins of Academic Deans & recommen dation of course Teachers	L	R	N	G	EMP	ENT	SD
3.	19Z5CC15 Lab - Biochemical Analysis	Sagaguchi test & separation of aminoacids by circular paper chromatography are included. Thin Layer chromatography is included as Spotter	10 %	As per the guidelines of Academic Deans	L	R	N	G	EMP	-	SD
4.	19Z5CC16 Lab - Molecular Biology	Isolation of UV mutations using - colony plate - Replica plating, setting up of Southern blotting, Chemical mutagenesis & Genotoxicity analysis are included. Agrose gel electrophoresis & SDS-PAGE are included as Spotters	10%	As per the guidelines of Academic Deans & Recomm endation of course Teachers	L	R	N	G	EMP	-	SD

5.	19Z5ME2 Animal Behaviours	The Following topics are included Unit I – Hormonal regulation of Behaviour, Ethogram, Unit – III Social & Reproductive behaviours – Strategies of mating System, Mating behaviour of Penguins	10 %	As per the guidelines of Academic Deans & Recommend ation of course Teachers	L	R	N	G	E M P	–	S D
6.	19Z6CC19 Lab – Immunology	ELISA, Western Blot, Flow cytometry are included as spotters. Amniocentesis, Pregnancy diagnostic kit, Haemocytometer, Centrifuge and Semi automated analyzer are included as spotters in Clinical Laboratory Techniques	10 %	As per the guidelines of Academic Deans & Recommen dation of course Teachers	L	R	N	G	E M P	–	S D
7.	19Z6CC20 Lab – Biotechnology	Isolation of genomic DNA from goat liver / bacteria, Isolation of genomic DNA from plants are included. Southern blotting & UV transilluminator are included as Spotters	10 %	As per the guidelines of Academic Deans & Recommen dation of course teachers	L	R	N	G	E M P	–	S D
8.	19Z6ME4 Clinical Laboratory Techniques	The following topic are included – Unit II, Analysis of urine, Benedicts test, Bence Jonse protein test, Nitroprusside test Unit III – Hematology, Erythrocyte Sedimentation Rate, Unit V – Semen analysis, Cryopreservation, chorion villus Sampling and Foetoscopy	10 %	As per the guidelins of Academic Deans & Recommen dation of course Teachers	L	R	N	G	E M P	–	S D

2. UPDATION OF OPEN EDUCATIONAL RESOURCES

S. NO	COURSE CODE	COURSE TITLE	DETAILS OF UPDATION
–	–	–	NIL

3. REVISION OF COURSES

S. NO	COURSE CODE & COURSE TITLE	UNIT NO & REVISED CONTENT	% of REVI	NEED FOR REVISION	RELEVANCE TO				SCOPE FOR		
					L	R	N	G	EMP	ENT	SD
1.	19Z3CC9 Lab - Human Physiology & Environmental Biology	Determination of BMI & Blood pressure among the Students & Estimation of Haemoglobin are included under Human Physiology experiments. Glucometer is included as Spotter. Study of diversity of flora & fauna in terrestrial using Quadrant method is included under Environmental Biology	12 %	As per the guidelines of Academic Deans & the recommendation of course teachers	-	-	N	G	EMP	-	SD
2.	19Z4CC12 Lab - Microbiology & Evolution	Preparation of different types of Media, Isolation of micro organisms from soil, air & water, Qualitative analysis of Milk - methylene blue reductase test are included as experiments in Microbiology. Hot air oven & colony counter are included as spotters.	12 %	As per the guidelines of Academic Deans & recommendation of course teachers	-	-	N	G	EMP	-	SD
3.	21Q4ACZ4 Lab - Developmental Botany & Plant Breeding	Tranverse sectioning of Dicot stem showing secondary growth, mounting of Anisocytic, paracytic & Diacytic Stomata & Identification of Globular, Chordate & mature Stages of embryo in Tridax are included as experiments.	12 %	As per the guidelines of Academic Deans & recommendation of course teachers	-	-	N	G	EMP	-	SD

4.	19Z5CC14 Molecular Biology	The following topics are included in Unit-III - Transcription in Prokaryotes- Pribnow box, difference between Prokaryote and Eukaryotic transcription, Reverse transcription & inhibitors of transcription. Protein targeting to Mitochondria & other organelles, protein degradation- intein splicing & covalent modification	15 %	As per the guidelines of Academic Deans & recommend -ations of course teachers	-	-	N	G	-	-	S	D
5.	19Z5SB4 Sericulture	History of Sericulture, Sericulture Research Institutes in India, Eri, Tasar & Muga silks are included in unit-I - Introduction to Sericulture Propagation - vegetative cutting, grafting & layering methods Application & significance of Biofertilizers are included in unit-II	10 %	As per the guidelines of Academic Deans & Recommen dation of course Teachers	L	R	N	G	EMP	ENT	S	D
6.	19Z6ME3 Embryo-logy	In vitro fertilization - Test tube baby & Assisted Reproductive Technology ART, IUI, ICSI, GIFT, ZIFT embryo transfer & Bioethics are included in Unit V - Human Embryology	10 %	As per the guidelines of Academic Deans & Recommen dation of course teachers	-	-	N	G	-	-	S	D
7.	19Z6ME6 Entomology	General structure & modifications of antennae, mouth parts, legs & wings are specified and the topic mechanism & significance of Bioluminescence is included in unit-II Morphology and Metamorphosis.	10 %	As per the guidelines of Academic Deans & recommen dation of course Teachers	-	-	N	G	-	-	S	D

4. NEW COURSES INTRODUCED

NEW COURSES INTRODUCED										
S. NO	COURSE CODE	COORSE TITLE	RELEVANCE TO				SCOPE FOR			NEED FOR INTRODUCTION
			L	R	N	G	EMP	ENT	SD	
1.		Herbal cosmetics	L	R	N	G	EMP	ENT	SD	For the advanced Learners

5. INTRODUCTION OF PURELY SKILL-EMBEDDED CERTIFICATE / DIPLOMA / ADVANCED DIPLOMA: NIL

S. NO	COURSE CODE	COORSE TITLE	MOU WITH INDUSTRY/ ORGANIZATION	SKILLS SHARPENED	COURSE OUTCOME
—	—	NIL	-	—	—

6. APPROVAL OF Ph.D COURSE WORK SYLLABUS: NIL

7. RUBRICS FOR INTERNSHIP / PROJECT: NIL

S.NO	C1 20 MKS	C2 20 MKS	CIA TOTAL 40 MKS	EXTERNAL 60 MKS
—	—	—	—	—

Details of Proposed/Signed MOUs – NIL

SUGGESTIONS	COMMENDATIONS
1. In addition to the Scientific names of the organisms, their common names can also be included. 2. Field visits can be included as a part of the skill based / Lab courses.	1. Changes made in the content of all the revised courses are useful and appropriate. 2. Inclusion of new experiments in the Lab courses will improve the skills of the students.

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2. Dr. V. Shanmugaiah	University Nominee 5/4/23
3. Dr. P. J. Joslin	Subject Expert P. J. Joslin 5/4/2023
4. Dr. R. Uma Maheswari	Subject Expert R. Uma Maheswari 5/4/23
5. Dr. A. Vanniarajan	Industrialist / scientist A. Vanniarajan 05/04/23
6. Miss. S. Subaritha	Alumna S. Subaritha 05/04/23
7. Dr. A. Rajeswari	Dean of Academic Affairs 5/04/2023
8. Dr. Antony Amala Jayaseeli	Antony Amala Jayaseeli 05/04/23
9. Dr. N. Malathi	N. Malathi 5/4/2023
10. Dr. J. Asnet Mary	J. Asnet Mary 5/4/2023
11. Dr. V. Bharathy	V. Bharathy 5/4/23
12. Dr. N. Nagarani	N. Nagarani 5/4/23
13. Dr. S. Barathy	S. Barathy 5/4/23
14. Mrs. J. Thelma	J. Thelma 5/4/23
15. Mrs. D. Kayathri	D. Kayathri 5/4/23

05/04/2023

II & III UG

REVISED SYLLABUS

S.No	Course Code	Course Title	Hrs	Credit
1.	19Z3CC9	Lab - Human Physiology & Environmental Biology	3	2
2.	19Z4CC12	Lab - Microbiology & Evolution	3	2
3.	21Q4ACZ4	Lab - Developmental Botany & Plant Breeding	2	2
4.	19Z5CC14	Molecular Biology	6	4
5.	19Z5SB4	Sericulture	2	2
6.	19Z6ME3	Embryology	5	5
7.	19Z6ME6	Entomology	5	5

OLD SYLLABUS

II B.Sc. Zoology

SEMESTER – III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z3CC9	Lab - Human Physiology &Environmental Biology	Practical	3	2

COURSE DESCRIPTION

The course focuses on the interactions between organisms and the environment, and the consequences of these interactions in natural populations, communities and ecosystems through experimental approach

COURSE OBJECTIVES

- To gain skills in analyzing the clinical and environmental samples and to learn basic techniques in human physiology and environmental biology
- To understand the functioning of organisms at the molecular, cellular, organ and organism level.

HUMAN PHYSIOLOGY **7 %**

1. Effect of pH and Temperature on salivary amylase activity in man
2. Preparation of haemin and haemochromogen Crystals
3. Test for proteins - Qualitative analysis of proteins – Ninhydrin and Biuret
4. Analysis of blood Sugar and Urea
5. Analysis of Urine Sugar and Albumin
6. Qualitative analysis of urea, ammonia and creatinine
7. Estimation of Uric Acid

8. Spotters - ECG, BMI Chart
9. Spotters - Hormonal disorders – Gigantism, Cretinism, Diabetes & Goitre

ENVIRONMENTAL BIOLOGY **5 %**

1. Estimation of Dissolved O_2 and CO_2 in given water samples
2. Measure pH of different water samples using pH meter, pH paper and indicator solution.
3. Model preparation of food chain, food web in different ecosystem

4.Spotters - *Mysis*, *Lucifer*, *Calanus* and *Zoea*

REFERENCES:

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,* 1stedition., Himalaya Publishing House Pvt. Ltd., Mumbai.
4. Dutta A., (2009). *Experimental Biology Lab manual,* Narosa Publishing House, New Delhi.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6825871/**
2. **https://www.youtube.com/watch?v=kwRgNNI6xrM**
3. **https://www.youtube.com/watch?v=frtln5ZoeNQ**
4. **https://www.youtube.com/watch?v=frtln5ZoeNQ&t=286s**
5. **https://www.youtube.com/watch?v=OsdhNtNNNds**

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids

UNIT -1 HUMAN PHYSIOLOGY				
1.1	Effect of pH and Temperature on salivary amylase activity in man	3	Demonstration & hands on training	Human saliva
1.2	Preparation of haemin and haemochromogen Crystals	3	Demonstration & hands on training	Human Blood
1.3	Test for proteins - Qualitative analysis of proteins – Ninhydrin and Biuret	3	Demonstration & hands on training	Protein Sample
1.4	Analysis of blood Sugar and Urea	3	Demonstration & hands on training	Human Blood
1.5	Analysis of Urine Sugar and Albumin	3	Demonstration & hands on training	Urine sample
1.6	Qualitative analysis of urea, ammonia and creatinine	3	Demonstration & hands on training	
1.7	Estimation of Uric Acid	3	Demonstration & hands on training	
1.8	Spotters - ECG, BMI Chart	3	Discussion	Spotters
1.9	Spotters - Hormonal disorders – Gigantism, Cretinism, Diabetes & Goitre	3	Discussion	Spotters
UNIT -2 ENVIRONMENTAL BIOLOGY				
2.1	Estimation of Dissolved O_2 and CO_2 in given water	3	Demonstration & hands on training	Green Board Charts

	samples			
2.2	Measure pH of different water samples using pH meter, pH paper and indicator solution.	3	Demonstration & hands on training	Green Board
2.3	Model preparation of food chain, food web in different ecosystem	3	Model	
2.4	Spotters - *Mysis*, *Lucifer*, *Calanus* and *Zoea*	3	Discussion	Preserved slides

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 TAXONOMY)**	**PSOs ADDRESSED**

CO 1	Associate the effect of pH and temperature on salivary amylase activity in man.	**K1**	PSO1, PSO2 PSO3
CO 2	Infer the qualitative analysis and estimation of biomolecules.	**K1**	PSO2, PSO7
CO 3	Compare the preparation of haemin and haemochromogen crystals.	**K2**	PSO2, PSO5, PSO6
CO 4	Determine the amount of dissolved oxygen and carbon dioxide in the given water samples.	**K2**	PSO2, PSO7
CO 5	Prepare the models for food chain and food web in different ecosystem and identification of spotters.	**K2**	PSO2, PSO7

Mapping COs Consistency 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	3	3	2	2	2	2	2	2	2	2	2
CO2	2	3	2	2	2	2	3	2	2	2	2	2
CO3	2	2	2	2	3	3	2	2	2	2	2	2
CO4	2	3	2	2	2	2	3	2	2	2	2	2
CO5	2	3	2	2	2	2	3	2	2	2	2	2

Mapping of COs with POs

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

COURSE DESIGNER:

Dr. Sr. Biji Cyriac

Forwarded By

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

HOD'S Signature & Name

NEW SYLLABUS

II B.Sc. Zoology

SEMESTER – III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z3CC9	Lab - Human Physiology &Environmental Biology	Practical	3	2

COURSE DESCRIPTION

The course focuses on the interactions between organisms and the environment, and the consequences of these interactions in natural populations, communities and ecosystems through experimental approach

COURSE OBJECTIVES

- To gain skills in analyzing the clinical and environmental samples and to learn basic techniques in human physiology and environmental biology
- To understand the functioning of organisms at the molecular, cellular, organ and organism level.

HUMAN PHYSIOLOGY

10. Effect of pH and Temperature on salivary amylase activity in man
11. Preparation of haemin and haemochromogen Crystals
12. Test for proteins - Qualitative analysis of proteins – Ninhydrin and Biuret
13. Analysis of blood Sugar and Urea
14. Analysis of Urine Sugar and Albumin
15. Qualitative analysis of urea, ammonia and Uric Acid

16. Determination of BMI and Blood Pressure among the students.
17. Estimation of Haemoglobin
18. Spotters – ECG,Glucometer and Hormonal disorders – Gigantism, Cretinism, Diabetes & Goitre

ENVIRONMENTAL BIOLOGY

1. Estimation of Dissolved O_2 and CO_2 in given water samples
2. Measure pH of different water samples using pH meter, pH paper and indicator solution.
3. Model preparation of food chain, food web in different ecosystem
4. Study of diversity of flora and fauna in terrestrial using Quadrant method.

4.Spotters - *Mysis*, *Lucifer*, *Calanus* and *Zoea*

REFERENCES:

5. Rajan S., Christy, S.R., (2011). *Experimental procedures in Life Sciences*, Anjana Book House, Chennai.
6. Sinha J., Chatterjee A.K., Chattopadhyay P., (2015). *Advanced Practical Zoology*, Books and Allied (P) Ltd., Calcutta.
7. Tembhare D.B., (2008). *Techniques in Life Sciences,* 1st edition., Himalaya Publishing House Pvt. Ltd., Mumbai.
8. Dutta A., (2009). *Experimental Biology Lab manual,* Narosa Publishing House, New Delhi.

DIGITAL OPEN EDUCATIONAL RESOURCES

6. **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6825871/**
7. **https://www.youtube.com/watch?v=kwRgNNI6xrM**
8. **https://www.youtube.com/watch?v=frtln5ZoeNQ**
9. **https://www.youtube.com/watch?v=frtln5ZoeNQ&t=286s**
10. **https://www.youtube.com/watch?v=OsdhNtNNNds**

11. COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 HUMAN PHYSIOLOGY				
1.1	Effect of pH and Temperature on salivary amylase activity in man	3	Demonstration & hands on training	Human saliva
1.2	Preparation of haemin and haemochromogen Crystals	3	Demonstration & hands on training	Human Blood
1.3	Test for proteins - Qualitative analysis of proteins – Ninhydrin and Biuret	3	Demonstration & hands on training	Protein Sample
1.4	Analysis of blood Sugar and Urea	3	Demonstration & hands on training	Human Blood
1.5	Analysis of Urine Sugar and Albumin	3	Demonstration & hands on training	Urine sample
1.6	Qualitative analysis of urea, ammonia and creatinine	3	Demonstration & hands on training	
1.7	Estimation of Uric Acid Determination of BMI and Blood Pressure among the students. Estimation of Haemoglobin	3	Demonstration & hands on training	
1.8	Spotters - ECG, BMI Chart	3	Discussion	Spotters

1.9	Spotters - Hormonal disorders – Gigantism, Cretinism, Diabetes & Goitre	3	Discussion	Spotters
UNIT -2 ENVIRONMENTAL BIOLOGY				
2.1	Estimation of Dissolved O_2 and CO_2 in given water samples	3	Demonstration & hands on training	Green Board Charts
2.2	Measure pH of different water samples using pH meter, pH paper and indicator solution.	3	Demonstration & hands on training	Green Board
2.3	Model preparation of food chain, food web in different ecosystem	3	Model	
2.4	Spotters - *Mysis*, *Lucifer*, *Calanus* and *Zoea*	3	Discussion	Preserved slides

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

12.

13. 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 TAXONOMY)	PSOs ADDRESSED
CO 1	Associate the effect of pH and temperature on salivary amylase activity in man.	**K1**	PSO1, PSO2 PSO3
CO 2	Infer the qualitative analysis and estimation of biomolecules.	**K1**	PSO2, PSO7
CO 3	Compare the preparation of haemin and haemochromogen crystals.	**K2**	PSO2, PSO5, PSO6
CO 4	Determine the amount of dissolved oxygen and carbon dioxide in the given water samples.	**K2**	PSO2, PSO7
CO 5	Prepare the models for food chain and food web in different ecosystem and identification of spotters.	**K2**	PSO2, PSO7

Mapping COs Consistency 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**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO2	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**
CO3	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**2**	**2**
CO4	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**
CO5	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**

Mapping of COs with POs

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

COURSE DESIGNER:

Dr. Sr. BijiCyriac

Forwarded By

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

HOD'S Signature & Name

OLD SYLLABUS

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	**19Z4CC12**	**Lab - Microbiology & Evolution**	**Practical**	**3**	**2**

COURSE DESCRIPTION

To gain skills in analyzing the clinical and environmental samples and to learn basic techniques in microbiology and evolution

COURSE OBJECTIVES

- Understand the basic principles of Microbiology.
- Develop skills and competence in standard microbiological laboratory techniques.
- Demonstrate the natural selection and Hardy-Weinberg Equilibrium

UNITS

UNIT –I MICROBIOLOGY **12%**

1. Laboratory biosafety Measures
2. Working Principle and Applications of Autoclave, Laminar Air Flow, Incubator and pH meter
3. Staining - Simple, Negative and Gram Staining
4. Preparation of Media- agar and broth
5. Serial Dilution Technique
6. Isolation of Single Colony using Pour plate, Streak plate, Spread plate.
7. Water quality analysis -MPN method Hanging drop method

UNIT –II EVOLUTION

1. Animals of Evolutionary Importance - *Peripatus*, *Limulus* and *Archaeopteryx*
2. Mimicry- Leaf insect and Stick Insect
3. Animals with adaptive coloration – Chameleon
4. Horse Evolution model
5. Human evolution model
6. Homologus organs – forelimb and skeletal of vertebrates
7. Analogus – Wing modification
8. Hardy-Weinberg Equilibrium by using beads
9. Natural selection by using beads

REFERENCES:

1. Sinha J., Chatterjee A.K., Chattopadhyay P. (2015). *Advanced Practical Zoology,* Books and Allied (P) Ltd., Calcutta.
2. Armugam, N., & Narayan L.M., (2013). *Practical Zoology (3).* Saras publication, Tamil Nadu.
3. Rajan S., Christy, S.R. (2011). *Experimental procedures in Life Sciences*, Anjana Book House, Chennai.
4. Dutta A. (2009). *Experimental Biology Lab manual*, Narosa Publishing House, New Delhi.
5. Tembhare D.B. (2008). *Techniques in Life Sciences,* 1st edition., Himalaya Publishing House Pvt. Ltd., MumbaI

DIGITAL OPEN EDUCATION RESOURCES

1. http://www.uwyo.edu/molb2021/virtual-edge/
2. http://www.evo-ed.org/index.htm
3. http://oer2go.org/mods/en-boundless/www.boundless.com/microbiology/textbooks/boundless-microbiology-textbook/industrial-microbiology-17/index.html
4. https://www.merlot.org/merlot/viewMaterial.htm?id=484489821
5. https://www.nationalgeographic.org/encyclopedia/theory-evolution/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 MICROBIOLOGY				
1.1	Laboratory biosafety Measures	3	Discussion	
1.2	Working Principle and Applications of Autoclave, Laminar Air Flow, Incubator and pH meter	3	Discussion	Instruments
1.3	Staining - Simple, Negative and Gram Staining	3	Hands on training	Slides & Microscope
1.4	Preparation of Media- agar and broth	3	Demonstration & hands on training	Nutrient Agar & broth
1.5	Serial Dilution Technique	3	Demonstration	Sample
1.6	Isolation of Single Colony using Pour plate, Streak plate, Spread plate.	3	Demonstration	Sample from serial dilution technique
1.7	Water quality analysis - MPN method Hanging drop method	3	Demonstration & Hands on training	Culture
UNIT -2 EVOLUTION				
2.1	Animals of Evolutionary Importance - *Peripatus*, *Limulus* and	3	Demonstration	Spotters

	Archaeopteryx			
2.2	Mimicry- Leaf insect and Stick Insect	3	Demonstration	Spotters
2.3	Animals with adaptive coloration – Chameleon	3	Demonstration	Spotters
2.4	Horse Evolution model Human evolution model	3	Demonstration	Spotters
2.5	Homologus organs – forelimb and skeletal of vertebrates	3	Demonstration	Spotters
2.6	Analogus – Wing modification	3	Demonstration	Spotters
2.7	Hardy-Weinberg Equilibrium by using beads	3	Demonstration & hands on training	Beads
2.8	Natural selection by using beads	3	Demonstration & hands on training	Beads

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 TAXONOMY)	PSOs ADDRESSED
CO 1	Find the working Principle andApplications of instruments.	**K1**	PSO1, PSO2
CO 2	Demonstrate the microbiological techniques and water quality analysis	**K3**	PSO2, PSO7
CO 3	Identify the animals of evolutionary importance, adaptive coloration and in mimicry.	**K3**	PSO1, PS02 PSO7
CO 4	Identify the morphological evidences and the horse and human evolution model.	**K3**	PSO2, PSO7
CO 5	Analyze the Hardy – Weinberg equilibrium using beads.	**K3**	PSO1, PSO2, PSO8

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
CO1	3	2	2	2	2	2	2	2	2	2	2	2
CO2	2	3	2	2	2	2	3	2	2	2	2	2
CO3	3	2	2	2	2	2	3	2	2	2	2	2
CO4	2	3	2	2	2	2	3	2	2	2	2	2
CO5	3	3	2	2	2	2	2	2	2	2	2	2

Mapping of COs with POs

CO/PSO	PO1	PO2	PO3	PO4
CO1	3	2	3	2
CO2	2	3	3	2
CO3	2	3	3	2
CO4	2	3	2	2
CO5	2	3	1	2

Note: ♦ Strongly Correlated – **3** ♦ ModeratelyCorrelated – **2**
♦ WeaklyCorrelated -**1**

COURSE DESIGNER:

Dr. Sr. Biji Cyriac

Forwarded By

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

HOD'S Signature & Name

NEW SYLLABUS

II B.Sc. Zoology

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z4CC12	Lab - Microbiology & Evolution	Practical	3	2

COURSE DESCRIPTION

To gain skills in analyzing the clinical and environmental samples and to learn basic techniques in microbiology and evolution

COURSE OBJECTIVES

- Understand the basic principles of Microbiology.
- Develop skills and competence in standard microbiological laboratory techniques.
- Demonstrate the natural selection and Hardy-Weinberg Equilibrium

UNITS

UNIT –I MICROBIOLOGY

1. Laboratory biosafety Measures
2. Preparation of different types of Media.
3. Isolation of microorganisms from soil, air and water.
4. Isolation of Pure Culture using Pour plate, Streak plate & Spread plate.
5. Staining Techniques

a.Simple staining

b.Negative staining

c.Gram staining

6. Motility Test – Hanging drop method
7. Water Quality Analysis – MPN Method

8.Qualitative Analysis of Milk – Methylene blue reductase test

9.Spotters- Autoclave, Laminar Air Flow, Incubator, Hot Air Oven, ColonyCounter and pH meter

UNIT –II EVOLUTION

1.Animals of Evolutionary Importance - *Peripatus*, *Limulus* and *Archaeopteryx*

2.Mimicry- Leaf insect and Stick insect

3.Animals with adaptive coloration – Chameleon

4.Stages of Evolution – Horse & Human

5. Homologus organs – forelimb of vertebrates

6.Analogus organs – Modification of wing

7.Hardy-Weinberg Equilibrium by using beads

8.Natural selection by using beads

REFERENCES:

6. Sinha J., Chatterjee A.K., Chattopadhyay P. (2015). *Advanced Practical Zoology,* Books and Allied (P) Ltd., Calcutta.
7. Armugam, N., & Narayan L.M., (2013). *Practical Zoology (3).* Saras publication, Tamil Nadu.
8. Rajan S., Christy, S.R. (2011). *Experimental procedures in Life Sciences*, Anjana Book House, Chennai.
9. Dutta A. (2009). *Experimental Biology Lab manual*, Narosa Publishing House, New Delhi.
10. Tembhare D.B. (2008). *Techniques in Life Sciences,* 1st edition., Himalaya Publishing House Pvt. Ltd., MumbaI

DIGITAL OPEN EDUCATION RESOURCES

6. http://www.uwyo.edu/molb2021/virtual-edge/
7. http://www.evo-ed.org/index.htm
8. http://oer2go.org/mods/en-boundless/www.boundless.com/microbiology/textbooks/boundless-microbiology-textbook/industrial-microbiology-17/index.html

9. https://www.merlot.org/merlot/viewMaterial.htm?id=484489821
https://www.nationalgeographic.org/encyclopedia/theory-evolution/

CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 MICROBIOLOGY				
1.1	Laboratory biosafety Measures	3	Discussion	
1.2	Staining - Simple, Negative and Gram Staining	3	Hands on training	Slides & Microscope
1.3	Preparation of different types of Media.	3	Demonstration & hands on training	Nutrient Agar & broth
1.4	Isolation of microorganisms from soil, air and water.	3	Demonstration	Sample
1.5	Isolation of Single Colony using Pour plate, Streak plate, Spread plate.	3	Demonstration	Sample from serial dilution technique
1.6	Water quality analysis - MPN method Hanging drop method Qualitative Analysis of Milk – Methylene blue reductase test	3	Demonstration & Hands on training	Culture

1.7	Spotters- Autoclave, Laminar Air Flow, Incubator, Hot Air Oven, Colony Counter and pH meter	3	Demonstration	Intruments
UNIT -2 EVOLUTION				
2.1	Animals of Evolutionary Importance - *Peripatus*, *Limulus* and *Archaeopteryx*	3	Demonstration	Spotters
2.2	Mimicry- Leaf insect and Stick Insect	3	Demonstration	Spotters
2.3	Animals with adaptive coloration – Chameleon	3	Demonstration	Spotters
2.4	Horse Evolution model Human evolution model	3	Demonstration	Spotters
2.5	Homologus organs – forelimb and skeletal of vertebrates	3	Demonstration	Spotters
2.6	Analogus – Wing modification	3	Demonstration	Spotters
2.7	Hardy-Weinberg Equilibrium by using beads	3	Demonstration & hands on training	Beads
2.8	Natural selection by using beads	3	Demonstration & hands on training	Beads

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 TAXONOMY)	PSOs ADDRESSED
CO 1	Find the working Principle andApplications of instruments.	K1	PSO1, PSO2
CO 2	Demonstrate the microbiological techniques and water quality analysis	K3	PSO2, PSO7
CO 3	Identify the animals of evolutionary importance,	K3	PSO1, PS02 PSO7

	adaptive coloration and in mimicry.		
CO 4	Identify the morphological evidences and the horse and human evolution model.	**K3**	PSO2, PSO7
CO 5	Analyze the Hardy – Weinberg equilibrium using beads.	**K3**	PSO1, PSO2, PSO8

Mapping COs Consistency with PSOs

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO 10	PSO 11	PSO 12
CO1	3	2	2	2	2	2	2	2	2	2	2	2
CO2	2	3	2	2	2	2	3	2	2	2	2	2
CO3	3	2	2	2	2	2	3	2	2	2	2	2
CO4	2	3	2	2	2	2	3	2	2	2	2	2
CO5	3	3	2	2	2	2	2	2	2	2	2	2

Mapping of COs with POs

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

CO5	**2**	**3**	**1**	**2**

Note: ♦ Strongly Correlated – **3** ♦ModeratelyCorrelated – **2**
♦WeaklyCorrelated -**1**

COURSE DESIGNER:

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HOD'S Signature
& Name

OLD SYLLABUS

III B.Sc. Zoology

SEMESTER –V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5CC14	Molecular Biology	Lecture	6	4

COURSE DESCRIPTION

The course focuses on the structure of DNA double helix, structural organization of genome of prokaryotes and eukaryotes and the flow of information from genes to proteins through transcription and translation and regulation of gene expression.

COURSE OBJECTIVES

To understand the role of enzymes in the molecular processes of replication, repair mechanisms, transcription, translation and protein degradation.

UNITS

UNIT –I INTRODUCTION (18 HRS.)

DNA as the genetic material: Griffith experiment, Avery, McCarty, and MacLeod experiment, Hershey-Chase experiment – Organization of Genome of Prokaryotes and Eukaryotes – histones – nucleosomes – heterochromatin &euchromatin, introns, exons – Watson & Crick DNA double helix – Properties of DNA.

Self-study - Griffith experiment, Hershey-Chase experiment

UNIT –II DNA REPLICATION AND REPAIR (18 HRS.)

DNA replication - Semi-conservative mode of replication &Meselson - Stahl experiment - enzymes involved: Primase, DNA Polymerase, Helicase, Topoisomerases, SSBs – Initiation, elongation and termination - DNA damage and repair mechanisms - Direct, Excision, and Mismatch repair mechanisms.

Self-study - DNA damage

UNIT –III TRANSCRIPTION (18 HRS.)

10%

Central dogma of Molecular biology - Transcription: Enzymes involved: RNA polymerase - mechanism of transcription: Initiation, elongation, termination – Promoter sites – Transcription in Eukaryotes – Post-transcriptional modifications: Capping, Splicing and poly adenylation.

Self-study – Structure of RNA polymerase

UNIT –IV TRANSLATION, PROTEIN FOLDING & TARGETING (18 HRS.)

5 %

Properties of Genetic code - Mechanism of translation in Prokaryotes: Initiation, elongation, termination – Gene regulation in prokaryotes - lac operon – Brief account on Post translational modifications - protein targeting - protein degradation.

Self-study – Properties of genetic code

UNIT –V BIOINSTRUMENTATION (18 HRS.)

Water as universal solvent, ionization of water, buffer – Principle and applications of pH metry, Colorimeter, Centrifugation - Protein separation: fractionation – dialysis – paper chromatography (ascending, descending and circular), thin layer chromatography - column chromatography – ion exchange chromatography.

Self-study - Principle and applications of pH metry

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only) (18 HRS.)

Current trends in Molecular Biology

REFERENCES:

1. Arumugam N. (2014). *Molecular Biology*. Saras Publications, Nagercoil.
2. Thiravia Raj S. (1993). *Biophysics*, Saras Publication, Kanyakumari.
3. Cooper G.M. and Robert E.H. (2009). *The Cell: A Molecular Approach*, 5th ed., ASM Press, Washington, D.C., and Sinauer Associates, Inc., Sunderland, Massachusetts.
4. Brown T.A. (2002). *Genomes*, 2nd ed., Wiley – Liss publications, New York.
5. Weaver R. (1999). *Molecular Biology*, WCB / McGraw-Hill, London.
6. Watson J.D., Baker T.A., Stephen B.P., Gann A., Levine M and Losick R., (2004). *Molecular Biology of the Gene*, 5th ed., Pearson Education.
7. Lodish D.J and Baltimore D. (2004). *Molecular Cell Biology*, 5th ed., Sci. American Books, W.H. Freeman and Company, New York.
8. Wolfe S.L. (1995). *An Introduction to Cell and Molecular Biology*, Wadsworth Publishing Company, New York.
9. De Robertis, E.D.P and De Robertis E.M.F. (1988). *Cell and Molecular Biology*, 8th ed., International ed., Infomed, Hong Kong.
10. Malacinski G.M. (2008). *Freifelder's Essentials of Molecular Biology*, 4th ed., Narosa Publishing House, New Delhi.
11. Rastogi S.C. (2003). *Cell and Molecular Biology*, 2nd ed., New Age International Pvt. Limited Publishers, Daryaganj, New Delhi.
12. J. Jeyaraman, (1980). *Techniques in Biology*, School of Biological Sciences, MKU,.
13. S.C.Rastogi, (2003). *Cell and Molecular Biology*, New Age International (P) Ltd Publishers, New Delhi.
14. Subramanian M.A. (2008). *Biophysics- Principles and Techniques*, M.J.P Publishers, Chennai.

15. S.Palanisamy&M.Shanmugavelu, (2006). *Principles of Biophysics*, Paramount Publications.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. https://www2.le.ac.uk/projects/vgec/highereducation/topics/geneexpression-regulation
2. https://www2.le.ac.uk/projects/vgec/highereducation/topics/dna-genes-chromosomes
3. https://www.chemguide.co.uk/organicprops/aminoacids/dna1.html
4. https://www.nature.com/scitable/definition/transcription-dna-transcription-87/
5. https://courses.lumenlearning.com/wm-biology1/chapter/prokaryotic-translation/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	DNA as the genetic material: Griffith experiment	2	Chalk & Talk	Black Board
1.2	Avery, McCarty, and MacLeod experiment, Hershey-Chase experiment	2	Chalk & Talk	LCD
1.3	Genome of Prokaryotes	3	Lecture	PPT & White board
1.4	Eukaryotes	2	Lecture	Smart Board

1.5	Histones – nucleosomes	2	Lecture	Black Board
1.6	Heterochromatin &euchromatin, introns, exons	1	Discussion	Google classroom
1.7	Watson & Crick DNA double helix	2	Lecture	DNA model
1.8	Properties of DNA	1	Discussion	Black Board
1.9	Semi-conservative mode of replication - Meselson - Stahl experiment.	3	Chalk & Talk	LCD
UNIT -2 DNA REPLICATION AND REPAIR				
2.1	DNA replication	2	Discussion	Black Board
2.2	enzymes involved: Primase, DNA Polymerase	2	Chalk & Talk	LCD
2.3	Helicase, Topoisomerases, SSBs	2	Lecture	PPT & White board
2.4	Initiation, elongation of Replication	2	Lecture	Smart Board
2.5	Termination of Replication	2	Lecture	Black Board
2.6	Direct repair mechanism	2	Chalk & Talk Discussion	Google classroom
2.7	Nucleotide excision repair mechanisms	2	Lecture	Black Board
2.8	Base excision repair	2	Discussion	Black Board

	mechanisms			
2.9	Mismatch repair mechanisms	2	Lecture	Black Board
UNIT -3 TRANSCRIPTION				
3.1	Central dogma of Molecular biology: Transcription	3	Chalk & Talk	Black Board
3.2	RNA polymerase - mechanism of transcription	2	Chalk & Talk	LCD
3.3	Initiation, elongation, termination	5	Lecture	PPT & White board
3.4	Promoter sites	2	Lecture	Smart Board
3.5	Transcription in Eukaryotes	2	Lecture	Black Board
3.6	Post-transcriptional modifications	4	Discussion	Google classroom
UNIT -4 TRANSLATION, PROTEIN FOLDING & TARGETING				
4.1	Properties of Genetic code	3	Chalk & Talk	Black Board
4.2	Mechanism of translation in Prokaryotes: Initiation	3	Chalk & Talk	LCD
4.3	Elongation, termination	4	Lecture	PPT & White board
4.4	Gene regulation in prokaryotes - *lac* operon	2	Lecture	Smart Board
4.5	Brief account on Post	2	Lecture	Black Board

	translational modifications			
4.6	Protein targeting	2	Discussion	Google classroom
4.7	Protein degradation.	2	Lecture	Black Board
UNIT – 5 BIOINSTRUMENTATION				
5.1	Water as universal solvent, ionization of water, buffer	1	Chalk & Talk	Black Board
5.2	Principle and applications of pH metry	1	Chalk & Talk	LCD
5.3	Colorimeter, Centrifugation	4	Lecture	PPT & White board
5.4	Protein separation: fractionation, dialysis	1	Lecture	Smart Board
5.5	paper chromatography (ascending, decending and circular)	1	Lecture	Black Board
5.6	Thin layer chromatography	1	Discussion	Google classroom
5.7	Column chromatography	2	Lecture	Black Board
5.8	Ion exchange chromatography	1	Discussion	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	Illustrate the Watson and Crick model of DNA double helix; mechanism of DNA replication and the role of enzymes	K1	PSO1 PSO4& PSO8
CO 2	Discuss the different types of DNA damages and repair mechanisms	K2	PSO1& PSO4
CO 3	Describe the transcription and translation in prokaryotes and eukaryotes	K1	PSO1 PSO4& PSO8
CO 4	Discuss the post-transcriptional modifications, properties of genetic code and role of repressor in gene regulation	K2	PSO1& PSO4
CO 5	Employ the appropriate separation technique based on the size, shape, and charge of biomolecules	K3	PSO1 PSO4& PSO8

Mapping of COs with PSOs

CO/ PSO	PSO1	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	2	2	2	3	2	2	2	2	2	2	2	2
CO3	2	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	3	2	2	2	2	2	2	2	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	2	2
CO2	2	2	3	2
CO3	2	3	2	2
CO4	2	2	1	2
CO5	2	2	2	2

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. J. Asnet Mary

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HOD'S Signature & Name

NEW SYLLABUS

III B.Sc. Zoology

SEMESTER –V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z5CC14	Molecular Biology	Lecture	6	4

COURSE DESCRIPTION

The course focuses on the structure of DNA double helix, structural organization of genome of prokaryotes and eukaryotes and the flow of information from genes to proteins through transcription and translation and regulation of gene expression.

COURSE OBJECTIVES

To understand the role of enzymes in the molecular processes of replication, repair mechanisms, transcription, translation and protein degradation.

UNITS

UNIT –I INTRODUCTION (18 HRS.)

DNA as the genetic material: Griffith experiment, Avery, McCarty, and MacLeod experiment, Hershey-Chase experiment – Organization of Genome of Prokaryotes and Eukaryotes – histones – nucleosomes – heterochromatin &euchromatin, introns, exons – Watson & Crick DNA double helix – Properties of DNA.

Self-study - Griffith experiment, Hershey-Chase experiment

UNIT –II DNA REPLICATION AND REPAIR (18 HRS.)

DNA replication - Semi-conservative mode of replication &Meselson - Stahl experiment - enzymes involved: Primase, DNA Polymerase, Helicase, Topoisomerases, SSBs – Initiation, elongation and termination - DNA damage and repair mechanisms - Direct, Excision, and Mismatch repair mechanisms.

Self-study - DNA damage

UNIT –III TRANSCRIPTIONIN PROKARYOTES (18 HRS.)

Central dogma of Molecular biology – Transcriptionin prokaryotes: Enzymes involved: RNA polymerase - mechanism of transcription: Initiation, elongation, termination. Promotor -Pribnow box (TATA Box)–Difference between Prokaryote and Eukaryotic transcription.Reverse transcription of RNA Virus, Inhibitors of Transcription.

Self-study – Structure of RNA polymerase

UNIT –IV TRANSLATION, PROTEIN FOLDING & TARGETING (18 HRS.)

Properties of Genetic code - Mechanism of translation in Eukaryotes: Initiation, elongation, termination — Brief account on Post translational modifications - protein targeting to Mitochondria and other Organelles- protein degradation – intein splicing & covalent modification. Gene regulation in prokaryotes - lac operon.

Self-study – Properties of genetic code

UNIT –V BIOINSTRUMENTATION (18 HRS.)

Water as universal solvent, ionization of water, buffer – Principle and applications of pH metry, Colorimeter, Centrifugation - Protein separation: fractionation – dialysis – paper chromatography (ascending, descending and

circular), thin layer chromatography - column chromatography – ion exchange chromatography.

Self-study - Principle and applications of pH metry

UNIT –VI DYNAMISM (Evaluation Pattern-CIA only) (18 HRS.)

Current trends in Molecular Biology

REFERENCES:

16. Arumugam N. (2014). *Molecular Biology*. Saras Publications, Nagercoil.
17. Thiravia Raj S. (1993). *Biophysics*, Saras Publication, Kanyakumari.
18. Cooper G.M. and Robert E.H. (2009). *The Cell: A Molecular Approach*, 5th ed., ASM Press, Washington, D.C., and Sinauer Associates, Inc., Sunderland, Massachusetts.
19. Brown T.A. (2002). *Genomes*, 2nd ed., Wiley – Liss publications, New York.
20. Weaver R. (1999). *Molecular Biology*, WCB / McGraw-Hill, London.
21. Watson J.D., Baker T.A., Stephen B.P., Gann A., Levine M and Losick R., (2004). *Molecular Biology of the Gene*, 5th ed., Pearson Education.
22. Lodish D.J and Baltimore D. (2004). *Molecular Cell Biology*, 5th ed., Sci. American Books, W.H. Freeman and Company, New York.
23. Wolfe S.L. (1995). *An Introduction to Cell and Molecular Biology*, Wadsworth Publishing Company, New York.
24. De Robertis, E.D.P and De Robertis E.M.F. (1988). *Cell and Molecular Biology*, 8th ed., International ed., Infomed, Hong Kong.
25. Malacinski G.M. (2008). *Freifelder's Essentials of Molecular Biology*, 4th ed., Narosa Publishing House, New Delhi.
26. Rastogi S.C. (2003). *Cell and Molecular Biology*, 2nd ed., New Age International Pvt. Limited Publishers, Daryaganj, New Delhi.
27. J. Jeyaraman, (1980). *Techniques in Biology*, School of Biological Sciences, MKU,.
28. S.C.Rastogi, (2003). *Cell and Molecular Biology*, New Age International (P) Ltd Publishers, New Delhi.

29. Subramanian M.A. (2008). *Biophysics- Principles and Techniques*, M.J.P Publishers, Chennai.
30. S.Palanisamy&M.Shanmugavelu, (2006). *Principles of Biophysics*, Paramount Publications.

DIGITAL OPEN EDUCATIONAL RESOURCES

6. https://www2.le.ac.uk/projects/vgec/highereducation/topics/geneexpression-regulation
7. https://www2.le.ac.uk/projects/vgec/highereducation/topics/dna-genes-chromosomes
8. https://www.chemguide.co.uk/organicprops/aminoacids/dna1.html
9. https://www.nature.com/scitable/definition/transcription-dna-transcription-87/
10. https://courses.lumenlearning.com/wm-biology1/chapter/prokaryotic-translation/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION				
1.1	DNA as the genetic material: Griffith experiment	2	Chalk & Talk	Black Board
1.2	Avery, McCarty, and MacLeod experiment, Hershey-Chase experiment	2	Chalk & Talk	LCD
1.3	Genome of Prokaryotes	3	Lecture	PPT & White board

1.4	Eukaryotes	2	Lecture	Smart Board
1.5	Histones – nucleosomes	2	Lecture	Black Board
1.6	Heterochromatin &euchromatin, introns, exons	1	Discussion	Google classroom
1.7	Watson & Crick DNA double helix	2	Lecture	DNA model
1.8	Properties of DNA	1	Discussion	Black Board
1.9	Semi-conservative mode of replication - Meselson - Stahl experiment.	3	Chalk & Talk	LCD
UNIT -2 DNA REPLICATION AND REPAIR				
2.1	DNA replication	2	Discussion	Black Board
2.2	enzymes involved: Primase, DNA Polymerase	2	Chalk & Talk	LCD
2.3	Helicase, Topoisomerases, SSBs	2	Lecture	PPT & White board
2.4	Initiation, elongation of Replication	2	Lecture	Smart Board
2.5	Termination of Replication	2	Lecture	Black Board
2.6	Direct repair mechanism	2	Chalk &Talk Discussion	Google classroom
2.7	Nucleotide excision repair	2	Lecture	Black Board

	mechanisms			
2.8	Base excision repair mechanisms	2	Discussion	Black Board
2.9	Mismatch repair mechanisms	2	Lecture	Black Board
UNIT -3 TRANSCRIPTION				
3.1	Central dogma of Molecular biology: Transcription	3	Chalk & Talk	Black Board
3.2	RNA polymerase - mechanism of transcription	2	Chalk & Talk	LCD
3.3	Initiation, elongation, termination	5	Lecture	PPT & White board
3.4	Promoter sites	2	Lecture	Smart Board
3.5	Transcription in Eukaryotes	2	Lecture	Black Board
3.6	Post-transcriptional modifications	4	Discussion	Google classroom
UNIT -4 TRANSLATION, PROTEIN FOLDING & TARGETING				
4.1	Properties of Genetic code	3	Chalk & Talk	Black Board
4.2	Mechanism of translation in Prokaryotes: Initiation	3	Chalk & Talk	LCD
4.3	Elongation, termination	4	Lecture	PPT & White board
4.4	Gene regulation in prokaryotes -	2	Lecture	Smart

	lac operon			Board
4.5	Brief account on Post translational modifications	2	Lecture	Black Board
4.6	Protein targeting	2	Discussion	Google classroom
4.7	Protein degradation.	2	Lecture	Black Board
UNIT – 5 BIOINSTRUMENTATION				
5.1	Water as universal solvent, ionization of water, buffer	1	Chalk & Talk	Black Board
5.2	Principle and applications of pH metry	1	Chalk & Talk	LCD
5.3	Colorimeter, Centrifugation	4	Lecture	PPT & White board
5.4	Protein separation: fractionation, dialysis	1	Lecture	Smart Board
5.5	paper chromatography (ascending, decending and circular)	1	Lecture	Black Board
5.6	Thin layer chromatography	1	Discussion	Google classroom
5.7	Column chromatography	2	Lecture	Black Board
5.8	Ion exchange chromatography	1	Discussion	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	Illustrate the Watson and Crick model of DNA double helix; mechanism of DNA replication and the role of enzymes	**K1**	PSO1 PSO4& PSO8
CO 2	Discuss the different types of DNA damages and repair mechanisms	**K2**	PSO1& PSO4
CO 3	Describe the transcription and translation in prokaryotes and eukaryotes	**K1**	PSO1 PSO4& PSO8
CO 4	Discuss the post-transcriptional modifications, properties of genetic code and role of repressor in gene regulation	**K2**	PSO1& PSO4
CO 5	Employ the appropriate separation technique based on the size, shape, and charge of biomolecules	**K3**	PSO1 PSO4& PSO8

Mapping of COs with PSOs

CO/ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10	PSO11	PSO12
CO1	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
CO2	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**

CO3	2	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	3	2	2	2	2	2	2	2	2

Mapping of COs with POs

CO/ PSO	PO1	PO2	PO3	PO4
CO1	2	2	2	2
CO2	2	2	3	2
CO3	2	3	2	2
CO4	2	2	1	2
CO5	2	2	2	2

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

Dr. J. Asnet Mary

Forwarded By

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HOD'S Signature & Name

OLD SYLLABUS

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.)

4%

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.)

6%

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 &SulochanaChetty 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	1	Chalk &	Black

	Mechanical tests, marketing		Talk	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	K2	PSO1 &

	silkworm and the methods of rearing.		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:

Dr. S. Barathy

Forwarded By

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NEW SYLLABUS

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.)

History and Scope of Sericulture– Silk route- Sericulture in India – Sericulture in Tamil Nadu -Role of Central Silk Board-Sericulture Research Institutes in India- National Sericulture Project (NSP) -Sericulture as Cottage industry - Classification of Silkworm-Mulberry and Non-mulberry (Eri, Tasar and Muga).

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-cutting, grafting and layering - Seedling – Micropropagation methods.Methods, application and significance of Biofertilizers -Triacontanol, Green manuring and Seriboost.

Self-study – Propagation: Vegetative

UNIT –III SILKWORM REARING (6 HRS.)

Biology and 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

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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	History and Scope of Sericulture – Silk route- Sericulture in India - Sericulture in Tamil Nadu	1	Chalk & Talk	Black Board
1.2	Role of Central Silk Board – Sericulture Research Institutes in India- 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(Eri, Tasar and	1	Chalk & Talk	Black Board

	Muga).			
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-cutting, grafting and layering - Seedling – Micropropagation methods	2	Chalk & Talk	Black Board
2.5	Methods, application and significance of 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	**K1**	PSO9

	sericulture as cottage industry and the support provided by Central Silk Board.		
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:

Dr. S. Barathy

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MADURAI-625 018

HOD'S Signature & Name

OLD SYLLABUS

III B.Sc. Zoology

SEMESTER –VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z6ME3	Embryology	Lecture	5	5

COURSE DESCRIPTION

This course imparts knowledge on the developmental process of egg to the formation of organism.

COURSE OBJECTIVES

To acquaint with the basic concepts of development of Organisms.

UNITS

UNIT –I INTRODUCTION TO EMBRYOLOGY (15 Hrs)

Historical Thoughts – Theories - Preformation, Epigensis, Baer's Law, Biogenetic Law, Pangenesis, Germ Plasm, Gradient Theory; Branches and Scope of Embryology

Gametes - Structure and Types of sperms and eggs - influence of yolk - polarity - symmetry - Egg membranes.

UNIT II - GAMETOGENESIS & FERTILIZATION (15 Hrs)

GAMETOGENESIS: Spermatogenesis and Oogenesis; Semination and Ovulation - Hormonal Control and factors affecting Ovulation & Induced Ovulation in Fisheries.

Fertilization - Physical, Chemical, Cytological and Physiological factors; Parthenogenesis – Types & Significance.

UNIT III - EARLY EMBRYONIC DEVELOPMENT (15 Hrs)

Cleavage: Salient features, Planes, Patterns and Physiology of Cleavage-MorphogeneticmovementsandFate map; Cleavage, Gastrulation and Fatemap of Frog, Chick and Rabbit.

UNIT IV – ORGANOGENESIS (15 Hrs)

Development of Brain, Eye,Heart and Foetal membranes in Chick and Mammals;Placenta - Characteristics, Classification, Functions and Development.

UNIT V - HUMAN EMBRYOLOGY (15 Hrs)

10 %

Sexual Cycles; Gastrulation, Implantation, development of germ layer, development of foetus (Brief account on Trimester stages); In vitro Fertilization; Infertility – Types and methods of treatment; Birth Control methods; Embryonic Stem Cell & its applications.

TEXTBOOKS:

1. Arumugam, N., (2014). *A Text Book of Embryology*. Fourteenth Edition.Saras Publication, Nagarcoil.

2. Bhatnagar S.M., Kothari M.L., Lopa A. Mehta and Natarajan, M., (2000). *Essentials of Human Embryology* -Third Edition, Orient Longman Ltd., Hyderabad, India.

REFERENCES:

1. Balinsky, B.I., (1981). *Introduction to Embryology*, Saunders, Philadelphia.

2. Majumdar. N.N., (1990).*Text book of Vertebrate Embryology*. Tata Mc-Graw-Hill Publishing Company Ltd, New Delhi.

3. McEwen, R.S., (1969). *Vertebrate Embryology*. Oxford and IBH Publishing Co., New Delhi.

4. Jam, P.C., (1998). *Elements of Developmental Biology*. Vishal Publication, Delhi.

5. Verma, P.S., V.K. Agarwal and Tyagi, (1995). *Chordate Embryology*, S. Chand & Co., New Delhi.

6. Vijiya D Joshi, *Prep Manual for Undergraduates Physiology* (2001), Second Edition, B. I. Published by Churchill Livingstone, New Delh

DIGITAL OPEN EDUCATIONAL RESOURCES

1. **https://embryology.med.unsw.edu.au/**
2. **https://www.med.umich.edu/lrc/coursepages/m1/embryology/embryo/links.htm**
3. **http://www.tulane.edu/~embryo/**
4. **https://www.3dembryoatlas.com/**
5. http://www.ncbi.books.cm/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO EMBRYOLOGY				
1.1	Branches and Scope of Embryology	2	Chalk & Talk	Black Board
1.2	Historical Thoughts – Theories - Preformation, Epigensis, Baer's Law, Biogenetic Law, Pangenesis, Germ Plasm, Gradient Theory	4	Chalk & Talk	LCD
1.3	Gametes - Structure and Types of sperms and eggs - influence of yolk - polarity - symmetry - Egg membranes.	4	Lecture	LCD
UNIT -2 GAMETOGENESIS & FERTILIZATION				
2.1	Spermatogenesis and Oogenesis; Semination and Ovulation	4	Lecture	LCD

2.2	GAMETOGENESIS: - Hormonal Control and factors affecting Ovulation & Induced Ovulation in Fisheries.	2	Chalk & Talk	Green Board
2.3	Fertilization - Physical, Chemical, Cytological and Physiological factors	5	Lecture	LCD
2.4	Parthenogenesis – Types & Significance.	2	Lecture	PPT
UNIT -3 EARLY EMBRYONIC DEVELOPMENT				
3.1	Cleavage: Salient features	2	Lecture	PPT
3.2	Cleavage: Planes, Patterns and Physiology of Cleavage	3	Lecture	PPT
3.3	Morphogenetic movements and Fate map	3	Lecture	PPT
3.4	Gastrulation and Fatemap of Frog, Chick and Rabbit.	6	Lecture	PPT
UNIT -4 ORGANOGENESIS				
4.1	Development of Brain, Eye, Heart	9	Lecture	PPT
4.2	Foetal membranes in Chick and Mammals	2	Lecture	PPT

4.3	Placenta - Characteristics, Classification, Functions and Development.	3	Lecture	PPT
UNIT -5 HUMAN EMBRYOLOGY				
5.1	Sexual Cycles; Gastrulation, Implantation, development of germ layer, development of foetus (Brief account on Trimester stages)	7	Lecture	PPT
5.2	In vitro Fertilization; Infertility – Types and methods of treatment	2	Lecture	PPT
5.3	Birth Control methods; Embryonic Stem Cell & its applications.	3	Lecture	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 - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	C6	CIA	ESE	Total
10	10	5	5	5	5	40	60	100

COURSE OUTCOME

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	Recall the basic concepts of developmental biology.	**K1**	PSO1& PSO2

CO 2	Tell how fertilization, cleavage and gastrulating occur.	**K1**	PSO3
CO 3	Compare the basic concepts of organogenesis in different organisms.	**K2**	PSO4
CO 4	Relate the development of egg into a foetus, then into adult, among Vertebrates.	**K2**	PSO5
CO 5	Associate the embryo development with Phylogeny.	**K2**	PSO7

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	2	2	3	2	2	2	2	2	2	2	2	2
CO3	2	2	2	3	2	2	2	2	2	2	2	2
CO4	2	2	2	2	3	2	2	2	2	2	2	2
CO5	2	2	2	2	2	2	2	3	2	2	2	2

Mapping of COs with POs

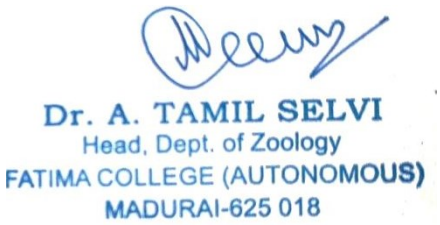
CO/ PSO	PO1	PO2	PO3	PO4
CO1	3	2	2	2
CO2	2	3	2	2
CO3	2	2	2	3
CO4	2	2	2	2
CO5	2	2	3	2

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

COURSE DESIGNER:

Dr. Antony AmalaJayaseeli

Forwarded By



HOD'S Signature & Name

NEW SYLLABUS

III B.Sc. Zoology

SEMESTER –VI

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z6ME3	Embryology	Lecture	5	5

COURSE DESCRIPTION

This course imparts knowledge on the developmental process of egg to the formation of organism.

COURSE OBJECTIVES

To acquaint with the basic concepts of development of Organisms.

UNITS

UNIT –I INTRODUCTION TO EMBRYOLOGY (15 Hrs)

Historical Thoughts – Theories - Preformation, Epigensis, Baer's Law, Biogenetic Law, Pangenesis, Germ Plasm, Gradient Theory; Branches and Scope of Embryology

Gametes - Structure and Types of sperms and eggs - influence of yolk - polarity - symmetry - Egg membranes.

UNIT II - GAMETOGENESIS & FERTILIZATION (15 Hrs)

GAMETOGENESIS: Spermatogenesis and Oogenesis; Semination and Ovulation - Hormonal Control and factors affecting Ovulation & Induced Ovulation in Fisheries.

Fertilization - Physical, Chemical, Cytological and Physiological factors; Parthenogenesis – Types & Significance.

UNIT III - EARLY EMBRYONIC DEVELOPMENT (15 Hrs)

Cleavage: Salient features, Planes, Patterns and Physiology of Cleavage-MorphogeneticmovementsandFate map; Cleavage, Gastrulation and Fatemap of Frog, Chick and Rabbit.

UNIT IV – ORGANOGENESIS (15 Hrs)

Development of Brain, Eye,Heart and Foetal membranes in Chick and Mammals;Placenta - Characteristics, Classification, Functions and Development.

UNIT V - HUMAN EMBRYOLOGY (15 Hrs)

Sexual Cycles; Gastrulation, Implantation, development of germ layer, development of foetus (Brief account on Trimester stages); Infertility – Types and methods of treatment - In vitro Fertilization - Test tube baby and Assisted Reproductive Technology (ART)- IUI, ICSI, GIFT, ZIFT Embryo Transfer; Birth Control methods; Embryonic Stem Cell & its applications.Bioethics

TEXTBOOKS:

1. Arumugam, N., (2014). *A Text Book of Embryology*. Fourteenth Edition.Saras Publication, Nagarcoil.

2. Bhatnagar S.M., Kothari M.L., Lopa A. Mehta and Natarajan, M., (2000). *Essentials of Human Embryology* -Third Edition, Orient Longman Ltd., Hyderabad, India.

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1. Balinsky, B.I., (1981). *Introduction to Embryology*, Saunders, Philadelphia.

2. Majumdar. N.N., (1990).*Text book of Vertebrate Embryology*. Tata Mc-Graw-Hill Publishing Company Ltd, New Delhi.

3. McEwen, R.S., (1969). *Vertebrate Embryology*. Oxford and IBH Publishing Co., New Delhi.

4. Jam, P.C., (1998). *Elements of Developmental Biology*. Vishal Publication, Delhi.

5. Verma, P.S., V.K. Agarwal and Tyagi, (1995). *Chordate Embryology*, S. Chand & Co., New Delhi.

6. Vijiya D Joshi, *Prep Manual for Undergraduates Physiology* (2001), Second Edition, B. I. Published by Churchill Livingstone, New Delh

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1. **https://embryology.med.unsw.edu.au/**
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3. **http://www.tulane.edu/~embryo/**
4. **https://www.3dembryoatlas.com/**
5. http://www.ncbi.books.cm/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO EMBRYOLOGY				
1.1	Branches and Scope of Embryology	2	Chalk & Talk	Black Board
1.2	Historical Thoughts – Theories - Preformation, Epigensis, Baer's Law, Biogenetic Law, Pangenesis, Germ Plasm, Gradient Theory	4	Chalk & Talk	LCD
1.3	Gametes - Structure and Types of sperms and eggs - influence of yolk - polarity - symmetry - Egg membranes.	4	Lecture	LCD
UNIT -2 GAMETOGENESIS & FERTILIZATION				
2.1	Spermatogenesis and Oogenesis; Semination and Ovulation	4	Lecture	LCD

2.2	GAMETOGENESIS: - Hormonal Control and factors affecting Ovulation & Induced Ovulation in Fisheries.	2	Chalk & Talk	Green Board
2.3	Fertilization - Physical, Chemical, Cytological and Physiological factors	5	Lecture	LCD
2.4	Parthenogenesis – Types & Significance.	2	Lecture	PPT
UNIT -3 EARLY EMBRYONIC DEVELOPMENT				
3.1	Cleavage: Salient features	2	Lecture	PPT
3.2	Cleavage: Planes, Patterns and Physiology of Cleavage	3	Lecture	PPT
3.3	Morphogenetic movements and Fate map	3	Lecture	PPT
3.4	Gastrulation and Fatemap of Frog, Chick and Rabbit.	6	Lecture	PPT
UNIT -4 ORGANOGENESIS				
4.1	Development of Brain, Eye, Heart	9	Lecture	PPT
4.2	Foetal membranes in Chick and Mammals	2	Lecture	PPT

4.3	Placenta - Characteristics, Classification, Functions and Development.	3	Lecture	PPT
UNIT -5 HUMAN EMBRYOLOGY				
5.1	Sexual Cycles; Gastrulation, Implantation, development of germ layer, development of foetus (Brief account on Trimester stages)	7	Lecture	PPT
5.2	In vitro Fertilization; Infertility – Types and methods of treatmentTypes and methods of treatment - In vitro Fertilization - Test tube baby and Assisted Reproductive Technology (ART)- IUI, ICSI, GIFT, ZIFT Embryo Transfer	2	Lecture	PPT
5.3	Birth Control methods; Embryonic Stem Cell & its applications.Bioethics.	3	Lecture	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 - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**C6**	**CIA**	**ESE**	**Total**
10	**10**	**5**	**5**	**5**	**5**	**40**	**60**	**100**

COURSE OUTCOME

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	Recall the basic concepts of developmental biology.	**K1**	PSO1& PSO2
CO 2	Tell how fertilization, cleavage and gastrulating occur.	**K1**	PSO3
CO 3	Compare the basic concepts of organogenesis in different organisms.	**K2**	PSO4
CO 4	Relate the development of egg into a foetus, then into adult, among Vertebrates.	**K2**	PSO5
CO 5	Associate the embryo development with Phylogeny.	**K2**	PSO7

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	2	2	3	2	2	2	2	2	2	2	2	2
CO3	2	2	2	3	2	2	2	2	2	2	2	2
CO4	2	2	2	2	3	2	2	2	2	2	2	2
CO5	2	2	2	2	2	2	2	3	2	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	2	2	3
CO4	2	2	2	2
CO5	2	2	3	2

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

COURSE DESIGNER:

Dr. Antony AmalaJayaseeli

Forwarded By

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

HOD'S Signature & Name

OLD SYLLABUS

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- Insectaupto 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.)

10 %

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 - 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.

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.

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 orders Thysanura, Orthoptera, Isoptera,	3	Chalk & Talk	LCD
1.3	Hemiptera, Coleoptera,	2	Lecture	PPT

	Lepidoptera			
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	3	Chalk &	Black

	crops		Talk	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**	**PSOs ADDRESSED**

		TAXONOMY)	
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

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

HOD'S Signature & Name

NEW SYLLABUS

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- Insectaupto 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- general structure and modifications; mouthparts- general structure and modifications; thorax- legs –general structure and modifications, wings- venation and modifications; 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–mechanism and significance.

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 - 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.

TEXT BOOK:

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

REFERENCES:

4. Vasantharaj D and Kumaraswami, D., (1998) *Elements of Economic entomology*, Popular book depot, Chennai.
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)

6. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4541473/
7. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6628405/
8. https://www.nature.com/articles/501S15a
9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6391707/
10. 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 orders Thysanura, Orthoptera, Isoptera,	3	Chalk & Talk	LCD
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, compound eyes	3	Lecture	Green Board Charts
2.2	antennae- general structure and modifications; mouthparts- general structure and modifications	2	Chalk & Talk	Green Board
2.3	Thorax- legs – general structure and modifications, wings- venation and modifications; 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- Mechanism and significance	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	S ilk, 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-	3	Chalk &	Black

	Horse flies, Warble flies		Talk	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	T2	Quiz	Assignment	OBT/PPT				
	10 Mks.	10 Mks.	5 Mks.	5 Mks	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**	**PSOs ADDRESSED**

		BLOOM'S TAXONOMY)	
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.	**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:

Dr. S. Barathy

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OLD SYLLABUS

II B.Sc. Zoology

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	21Q4ACZ4	Lab - Developmntal Botany & Plant Breeding	Practical	2	2

COURSE DESCRIPTION

To study basic functioning of plant life.

COURSE OBJECTIVES

To study Plant Anatomy, Physiology, Embryology and Plant breeding techniques

UNITS **12%**

1. Identification and transverse sectioning of stem, leaf and root prescribed in plant anatomy (Monocot and Dicot)
2. Mounting of leaf Epidermal peel showing Stomata
3. Demonstration to measure rate of Transpiration – Ganong's potometer
4. Demonstration of Rate of Photosynthesis – *Hydrilla* Experiment of Willmont's Bubbler using different colour filters
5. Demonstration of Anaerobic respiration
6. Identification of different stages of embryo in *Tridax*.
7. Demonstration of Emasculation techniques prescribed in the syllabus.
8. Demonstration Horticultural techniques prescribed in the syllabus

9. Spotters
10. Record note

TEXT BOOKS

1.Pandey B.P., (2000). *A text Book of Botany*.Chand and Company Ltd.Ram nagar, New Delhi.

2. Gupta P.K., (2000). *Principles of Plant breeding.* John Wiley, New York.

3.Rao M., (2002). *A text Book of Horticulture*.Laxmi Publications, New Delhi.

4.Ragland A & Jeyakumar., (2010). *Plant physiology*.Saras publication, Nagercoil.

5. Kumarasen V., (2009). *Plant breeding*, Saras publication, Nagercoil.

REFERENCES

1. Pandey B.P. A text Book of Botany. Chand and Company Ltd.Ram nagar, New Delhi (2000).
2. P.K.Gupta, Principles of Plant breeding. John Wiley, New York (2000).
3. Kumarasen.V. Plant breeding, Saras publication (2009)
4. Ragland. A & Jeyakumar. Plant physiology. Saras publication (2010).
5. Pandey B.P. Plant Anatomy, S. Chand & Co. De, New Delhi (2007).
6. Bhojwani, S.S. & Bhatnagar. S.P. Embryology of Angiosperms. Vikas Publishing House (P) Ltd., New Delhi (1994).
7. Rasool S.K. & Sekar T. Allied Botany . Popular Book Hour, Chennai - 15 (2002).

DIGITAL OPEN EDUCATIONAL RESOURCES (DOER) :

1. https://bio.libretexts.org/Bookshelves/Botany/Book%3A_Plant_Anatomy_and_Physiology_(Bellairs)
2. https://open.umn.edu/opentextbooks/textbooks/349

3. https://libguides.daltonstate.edu/PrinciplesofBiology/labmanual
4. https://libguides.cccua.edu/c.php?g=793104&p=5698907
5. https://courses.lumenlearning.com/wmopen-nmbiology1/chapter/outcome-cellular-respiration/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
PLANT ANATOMY				
1	Identification and transverse sectioning of stem, leaf and root prescribed in plant anatomy (Monocot and Dicot)	12	Sectioning	Specimen & Microscope
2	Mounting of leaf Epidermal peel showing Stomata	2	Dissection	Specimen & Microscope
3	Demonstration to measure rate of Transpiration – Ganong's potometer	2	Demonstration	Experimental setup
4	Demonstration of Rate of Photosynthesis – Hydrilla Experiment of Willmont's Bubbler using different colour filters	2	Demonstration	Experimental setup
5	Demonstration of Anaerobic respiration	2	Demonstration	Experimental setup
7	Identification of different stages of embryo in	2	Dissection	Specimen & Microscope

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	Tridax.			
8	Demonstration Horticultural techniques prescribed in the syllabus	2	Demonstration	Horticultural tools
9	Spotters	-	Discussion	specimen
10.	Record Note	-	Discussion	Specimen& Black Board

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)	
CO1	Illustrate the anatomy of Monocot and dicot stem , root and leaf	**K2**	PSO1,PSO2&PSO7
CO2	Interpret experimental set ups in plant physiology	**K2**	PSO1, PSO2,PSO3&PSO7
CO3	Apply the horticultural techniques of Cuttage and layerage	**K3**	PSO2&PSO7
CO4	Make use of emasculation technique	**K3**	PSO2, PSO7&PSO9
CO5	Identify specimens and slides from Plant anatomy, Physiology, Embryology , Plant Breeding & Horticulture included in the syllabus.	**K1**	PSO6, PSO7&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
CO1	3	3	3	3	2	2	3	3	2	2	2
CO2	3	3	3	3	2	2	3	3	2	2	2
CO3	3	3	3	3	3	2	3	3	2	2	2
CO4	3	3	3	3	2	2	3	3	3	2	2
CO5	3	3	3	3	3	3	3	3	3	2	2

Mapping of COs with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

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NEW SYLLABUS

II B.Sc. Zoology

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	21Q4ACZ4	Lab - Developmental Botany & Plant Breeding	Practical	2	2

COURSE DESCRIPTION

To study basic functioning of plant life.

COURSE OBJECTIVES

To study Plant Anatomy, Physiology, Embryology and Plant breeding techniques

UNITS

1. Transverse sectioning of stem and root showing primary structure (Monocot and Dicot)
2. Transverse sectioning of Leaf (Monocot and Dicot)
3. Transverse sectioning of Dicot stem showing secondary growth.
4. Mounting of leaf Epidermal peel showing different types of stomata (Anisocytic,Paracytic & Diacytic)
5. Identification of different stages of embryo in *Tridax* (Globular, Chordate & Mature embryo)
6. Demonstration of Emasculation techniques prescribed in the syllabus.
7. Demonstration Horticultural techniques prescribed in the syllabus
8. Demonstration of Rate of Photosynthesis – *Hydrilla* Experiment of Wilmott's Bubbler using different colour filters

9. Spotters
10. Record note

TEXT BOOKS

1.Pandey B.P., (2000). *A text Book of Botany*.Chand and Company Ltd.Ramnagar, New Delhi.

2. Gupta P.K., (2000). *Principles of Plant breeding.* John Wiley, New York.

3.Rao M., (2002). *A text Book of Horticulture*.Laxmi Publications, New Delhi.

4.Ragland A &Jeyakumar., (2010). *Plant physiology*.Saras publication, Nagercoil.

5. Kumarasen V., (2009). *Plant breeding*, Saras publication, Nagercoil.

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8. Pandey B.P. A text Book of Botany. Chand and Company Ltd.Ramnagar, New Delhi (2000).
9. P.K.Gupta, Principles of Plant breeding. John Wiley, New York (2000).
10. Kumarasen.V. Plant breeding, Saras publication (2009)
11. Ragland. A &Jeyakumar. Plant physiology. Saras publication (2010).
12. Pandey B.P. Plant Anatomy, S. Chand & Co. De, New Delhi (2007).
13. Bhojwani, S.S. &Bhatnagar. S.P. Embryology of Angiosperms. Vikas Publishing House (P) Ltd., New Delhi (1994).
14. Rasool S.K. &Sekar T. Allied Botany . Popular Book Hour, Chennai -15 (2002).

DIGITAL OPEN EDUCATIONAL RESOURCES (DOER) :

6. https://bio.libretexts.org/Bookshelves/Botany/Book%3A_Plant_Anatomy_and_Physiology_(Bellairs)

7. https://open.umn.edu/opentextbooks/textbooks/349

8. https://libguides.daltonstate.edu/PrinciplesofBiology/labmanual

9. https://libguides.cccua.edu/c.php?g=793104&p=5698907

10. https://courses.lumenlearning.com/wmopen-nmbiology1/chapter/outcome-cellular-respiration/

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
PLANT ANATOMY				
1	Identification and transverse sectioning of stem, leaf and root prescribed in plant anatomy (Monocot, Dicot & Dicot stem showing secondary growth).	12	Sectioning	Specimen & Microscope
2	Mounting of leaf Epidermal peel showing Stomata(Anisocytic,Paracytic&Diacytic)	2	Dissection	Specimen & Microscope
3	Demonstration to measure rate of Transpiration – Ganong'spotometer	2	Demonstration	Experimental setup
4	Demonstration of Rate of Photosynthesis – Hydrilla Experiment of Willmot's Bubbler using different colour filters	2	Demonstration	Experimental setup
5	Demonstration of Anaerobic respiration	2	Demonstration	Experimental setup
7	Identification of different stages	2	Dissection	Specimen

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
	of embryo in *Tridax.*(Globular, Chordate & Mature embryo)			& Microscope
8	Demonstration Horticultural techniques prescribed in the syllabus	2	Demonstration	Horticultural tools
9	Spotters	-	Discussion	specimen
10.	Record Note	-	Discussion	Specimen& Black Board

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	PSOs ADDRESSED

		TO REVISED BLOOM'S TAXONOMY)	
CO1	Illustrate the anatomy of Monocot and dicot stem , root and leaf	**K2**	PSO1,PSO2&PSO7
CO2	Interpret experimental set ups in plant physiology	**K2**	PSO1, PSO2,PSO3&PSO7
CO3	Apply the horticultural techniques of Cuttage and layerage	**K3**	PSO2&PSO7
CO4	Make use of emasculation technique	**K3**	PSO2, PSO7&PSO9
CO5	Identify specimens and slides from Plant anatomy, Physiology, Embryology , Plant Breeding & Horticulture included in the syllabus.	**K1**	PSO6, PSO7&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
CO1	3	3	3	3	2	2	3	3	2	2	2
CO2	3	3	3	3	2	2	3	3	2	2	2
CO3	3	3	3	3	3	2	3	3	2	2	2
CO4	3	3	3	3	2	2	3	3	3	2	2
CO5	3	3	3	3	3	3	3	3	3	2	2

Mapping of COs with POs

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

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

♦ Weakly Correlated -**1**

COURSE DESIGNER:

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