FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A" Grade by NAAC (3rd Cycle)
74th Rank in India Ranking 2020 (NIRF) by MHRD
Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT : ZOOLOGY

NAME OF THE PROGRAMME : B.Sc. ZOOLOGY

PROGRAMME CODE : UAZO

ACADEMIC YEAR : 2020 - 2021

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

DEPARTMENT OF ZOOLOGY

B.SC ZOOLOGY-SYLLABUS FRONT PAGE-2020-2021

For those who joined in June 2019 onwards

I & II B.Sc Zoology

PROGRAMME CODE : UAZO

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

PART – I – TAMIL

Offered by The Research Centre of Tamil

S.NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	19TLC1	Language-Modern Literature	5	3	40	60	100
2.	II	19TLC2	Language - Bakthi Literature	5	3	40	60	100
3.	III	19TLC3	Language- Epic Literature	5	3	40	60	100
4.	IV	19TLC4	Language-Sangam Literature	5	3	40	60	100
			Total	20	12			

PART – I – FRENCH

Offered by The Department of French

S.NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	19RLC1	PART 1 LANGUAGE FRENCH	5	3	40	60	100
2.	II	19RLC2	PART 1 LANGUAGE FRENCH	5	3	40	60	100
3.	III	19RLC3	PART 1 LANGUAGE FRENCH	5	3	40	60	100
4.	IV	19RLC4	PART 1 LANGUAGE FRENCH	5	3	40	60	100
			Total	20	12			

PART – I – HINDI

Offered by The Department of Hindi

S.NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	19DLC1	PART 1 LANGUAGE HINDI	5	3	40	60	100
2.	II	19DLC2	PART 1 LANGUAGE HINDI	5	3	40	60	100
3.	III	19DLC3	PART 1 LANGUAGE HINDI	5	3	40	60	100
4.	IV	19DLC4	PART 1 LANGUAGE HINDI	5	3	40	60	100
			Total	**20**	**12**			

PART – II -ENGLISH – 12 CREDITS

Offered by The Research Centre of English

S.NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	19E1LB1	BASIC COMMUNICATIVE ENGLISH	5	3	40	60	100
2.		19E1LI1	INTERMEDIATE COMMUNICATIVE ENGLISH	5	3	40	60	100
3.		19E1LA1	ADVANCED COMMUNICATIVE ENGLISH	5	3	40	60	100
4.	II	19E2LB2	ENGLISH COMMUNICATION SKILLS (BASIC)	5	3	40	60	100
5.		19E2LI2	ENGLISH FOR EMPOWERMENT (INTERMEDIATE)	5	3	40	60	100
6.		19E2LA2	ENGLISH FOR CREATIVE WRITING (ADVANCED)	5	3	40	60	100
7.	III	19ELC3	ENGLISH FOR DIGITAL ERA	5	3	40	60	100
8.	IV	19ELC4	ENGLISH FOR INTEGRATED DEVELOPMENT	5	3	40	60	100
			Total	**20**	**12**			

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

MAJOR CORE COURSES INCLUDING PRACTICALS : 60 CREDITS

S.NO	SEM.	COURSE CODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. Mks

1.	I	19Z1CC1	INVERTEBRATA	5	4	40	60	100
2.		19Z1CC2	CELL BIOLOGY	4	3	40	60	100
3.		19Z1CC3	LAB IN INVERTEBRATA & CELL BIOLOGY	3	2	40	60	100
4.	II	19Z2CC4	CHORDATA	5	4	40	60	100
5.		19Z2CC5	GENETICS	4	3	40	60	100
6.		19Z2CC6	LAB IN CHORDATA & GENETICS	3	2	40	60	100
7.	III	19Z3CC7	HUMAN PHYSIOLOGY	5	4	40	60	100
8.		19Z3CC8	ENVIRONMENTAL BIOLOGY	4	3	40	60	100
9.		19Z3CC9	LAB IN HUMAN PHYSIOLOGY & ENVIRONMENTAL BIOLOGY	3	2	40	60	100
10.	IV	19Z4CC10	MICROBIOLOGY	5	4	40	60	100
11.		19Z4CC11	EVOLUTION	4	3	40	60	100
12.		19Z4CC12	LAB IN MICROBIOLOGY& EVOLUTION	3	2	40	60	100

ALLIEDCOURSES- 20 CREDITS

S.NO	SEM.	COURSECODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	I	19Z1ACC1	ALLIED CHEMISTRY- I	3	3	40	60	100
2.		19Z1ACC2	LAB IN VOLUMETRIC ANALYSIS	2	2	40	60	100
3.	II	19Z2ACC3	ALLIED CHEMISTRY- II	3	3	40	60	100
4.		19Z2ACC4	LAB IN QUALITATIVE	2	2	40	60	100

			ORGANIC ANALYSIS					
5.	III	19Z3ACQ1	PLANT DIVERSITY & PATHOLOGY	3	3	40	60	100
6.		19Z3ACQ2	LAB- PLANT DIVERSITY & PATHOLOGY	2	2	40	60	100
7.		19C3ACZ1	ANIMAL DIVERSITY, PHYSIOLOGY &GENETICS	3	3	40	60	100
8.		19C3ACZ2	LAB- ANIMAL DIVERSITY, PHYSIOLOGY &GENETICS	2	2	40	60	100
9.	IV	19Z4ACQ3	DEVELOPMENTAL BOTANY &PLANT BREEDING	3	3	40	60	100
10.		19Z4ACQ4	LAB- DEVELOPMENTAL BOTANY &PLANT BREEDING	2	2	40	60	100
11.		19C4ACZ3	CELL & MOLECULAR BIOLOGY	3	3	40	60	100
12.		19C4ACZ4	LAB- CELL & MOLECULAR BIOLOGY	2	2	40	60	100

PART – IV – 20 CREDITS

S.No	SEM.	COURSECODE	COURSE TITLE	HRS	CREDIT	CIA Mks	ESE Mks	TOT. Mks
1.	I	19G1VE	Value Education (Including Meditation in Action Movement)	1	1	40	60	100
2.		19Z1NME	Non Major Elective - Maternity and Child Health (Offered to other major Students)	2	2	40	60	100
3.	II	19G2VE	Value Education	1	1	40	60	100
4.		19Z2NME	Non Major Elective - Maternity and Child Health (Offered to other major Students)	2	2	40	60	100

5.	III	19G3EE	Environmental Education	1	1	40	60	100
6.		19Z3SB1	Vermitechnology	2	2	40	60	100
7.	IV	19G4EE	Environmental Education	1	1	40	60	100
8.		19Z4SB2	Mushroom Cultivation	2	2	40	60	100

III UG Zoology – Syllabus

SYLLABUS OFFERED FROM JUNE 2018 ONWARDS

Sem	Sub Code	Title	Hrs	Credits	Test	Assi	Quiz	Int	Ext	Tot
V	Z5CC11	CORE SUBJECT (1) BIOCHEMISTRY	6	5	15	5	5	25	75	100
	Z5CC12	(2) MOLECULAR BIOLOGY	5	5	15	5	5	25	75	100
	Z5CC13	(3) BIOPHYSICS & INSTRUMENTATION	4	4	15	5	5	25	75	100
	Z5ME1/ Z5ME2	MAJORELECTIVE(1) EMBRYOLOGY/ ENTOMOLOGY	5	5	15	5	5	25	75	100
	Z5SB3	SKILL BASED SUBJECT(1) ORNAMENTAL FISH CULTURE	2	2	30	10	10	50	50	100
	Z5SB4	(2)SERICULTURE	2	2	30	10	10	50	50	100
	Z6CC16	MAJOR PRACTICAL-III	6	-	-	-	-	-	-	-
			30	23						
VI	Z6CC14	CORE SUBJECT (1) IMMUNOLOGY	5	5	15	5	5	25	75	100
	Z6CC15	(2) BIOTECHNOLOGY	5	5	15	5	5	25	75	100
	Z6ME3/ Z6ME4	MAJOR ELECTIVE (1) BIOSTATISTICS / CLINICAL LABORATORY TECHNIQUE	5	5	15	5	5	25	75	100
	Z6ME5/ Z6ME6	(2) BIOINFORMATICS / HUMAN GENETICS	5	5	15	5	5	25	75	100
	Z6SB5	SKILL BASED SUBJECT (1) APICULTURE	2	2	30	10	10	50	50	100
	Z6SB6	(2) DAIRY FARMNG	2	2	30	10	10	50	50	100
	Z6CC16	MAJOR PRACTICAL-III	6	6	-	-	-	40	60	100
			30	30						
		Mandatory Total Credits		140						
		Add on credits		20						

		TOTAL		**160**						

Add on credits

Courses	**Semester**	**Credits**	**Marks**
Computer Literacy	**I – Science; II - Arts**	**2**	**100**
Foundation course – Arts and science	**I & II**	**3+3**	**50+50**
Meditation Action Movement	**I-IV**	**2**	**100**
Human Rights	**V**	**2**	**100**
Out Reach Programmes	**V & VI**	**3**	**100**
Project	**VI**	**4**	**100**
Reading Culture	**I-VI**	**1**	**-**
TOTAL		**20**	

FATIMA COLLEGE (Autonomous), MADURAI-18
I SEMESTER - MAJOR CORE
INVERTEBRATA -19Z1CC1
(For those who joined in 2019 onwards)

HOURS/WEEK: 5 **CREDIT:4**

COURSE DESCRIPTION

This is an introductory taxonomy course to the Zoology Program which organizes the distribution of animals according to common characteristic features charted out by Linnaeus, all animals are classified into seven categories: kingdom, phylum, class, order, family, genus and species along with the type study.

COURSE OBJECTIVE/S

- To understand fundamental organization of animals at three levels – unicellular-diploblastic and triploblastic and the principles of classification with examples from invertebrates
- To comprehend the patterns of geographic distribution and natural history of animals living in terrestrial and marine ecosystems
- To explore : ecological and evolutionary processes responsible for generating and maintaining biological diversity

COURSE OUTCOMES (CO)

By the end of the course the students would be able to:

No.	Course Outcome	Knowledge Level(According to Bloom's Taxonomy)
CO 1	Describe the fundamental organization of animals	K1
CO 2	Explain the levels of organization of animal kingdom and origin of metazoan	K1
CO 3	List the general characters of animals from Phylum Protozoa to Phylum Echinodermata	K1
CO 4	Summarize the parasitic protozoans and types of nutrition in Protozoa	K2

CO 5	Classify Coelenterata based on Zooids	K2
CO6	Narrate the parasitic adaptations of helminth parasites	K1
CO7	Discriminate insects based on the modification of Mouth parts	K1
CO8	Discuss the modifications of foot in Mollusca and water vascular system in star fish	K2
CO9	Organize the diversity of animals from simple to complex through a chart/ model	K3

UNIT I INTRODUCTION [15 HRS]

Introduction to principles of classification & Binomial Nomenclature - Classification of Animal Kingdom - Levels of Organization-grades of Animal architecture, symmetry & Coelom - Origin of Metazoa.

UNIT II Acoelomate & Unicellular Organism [15 HRS]

Phylum – Protozoa : General characters and classification up to class level - Parasitic protozoans: Types of parasites- Malaria, Amoebiasis, Trypsanosomiasis, Leishmaniasis, Trichomoniasis, Toxoplasmosis, Balantidial dysentery - Nutrition in protozoa: Types of nutrition in *Amoeba*, *Euglena*, *Paramecium*. **Acoelomate & Multicellular Organisms-I: Phylum – Porifera:** General characters and classification up to class level - Canal system in sponges - **Phylum – Coelenterata:** General characters and classification up to class level- Polymorphism in Hydrozoa.

UNIT III Acoelomate & Multicellular Organisms-II [15 HRS]

Phylum- Platyhelminthes: General characters and classification up to class level. Type study: *Fasciola hepatica*, *Taenia solium* - **Pseudocoelomate Organisms: Phylum-Aschelminthes:** General characters and classification upto class level, Type study: *Ascaris lumbricoides*, *Wuchereria bancrofti*, *Enterobius vermicularis* - Parasitic Adaptations of human helminth parasites.

UNIT IV Coelomate organisms –I [15 HRS]

Phylum – Annelida: Living fossil, General characters and classification up to class level - Excretion in Annelida: Nereis, Earthworm, Leech. **Phylum – Arthropoda:** General characters and classification up to class level - Metamorphosis in insects: Types and hormonalcontrol, types of larvae, pupae - Mouth parts of Insects in Cockroach, bees, wasps, mosquitoes, housefly, butterflies.

UNIT V Coelomate Organisms-II [15 HRS]

Phylum – Mollusca: General characters and classification up to class level - Foot in Mollusca: Amphineura, Scaphopoda, Pelecypoda, Gastropoda, Cephalopoda and modifications of foot. **Phylum-Echinodermata:** General characters and classification upto class level - Water vascular system - Structure of water vascular system in Asteroidea, Echinoidea, Holothuroidea & Crinoidea and functions.

TEXT BOOKS:

1. A Manual of Zoology – Vol.I- M.Ekambaranatha Iyer, T.N.Ananthakrishnan-S.Viswanathan (Printers & Publishers)
2. Arumugam N., (2012) A Text book of Invertebrates, 4th edition, Saras publication, Nagercoil.

REFERENCE BOOKS:

1. Jordan E.L.and Verma P.S., (2001) Invertebrate Zoology, S.Chand & Co, New Delhi..
2. Kotpal.R.L., (1998) Modern Text Book of Zoology Invertebrates, Rastogi Publications, Meerut.
3. Gardiner M.S., Biology of Invertebrates, McGraw Hill Book co, New Delhi.
4. Hyman L.H., (1951) Invertebrate Series – Vol.I to Vol.IV, McGraw Hill Book co, Inc. New Delhi.
5. A Student Text Book of Zoology – Adam Sedgwick – Vol.1
6. Parker & Haswell., (1964) A Text Book of Zoology – Vol.I, Macmillan & co Ltd, New Delhi.
7. Prasad S.N., (1989) Invertebrate Zoology, Vikas publishing House Pvt Ltd, India.

COURSE DESIGNER:

Dr. N.MALATHI

I SEMESTER
MAJOR CORE
CELL BIOLOGY - 19Z1CC2
(For those who joined in 2019 onwards)

HOURS/WEEK: 4 **CREDIT:3**

COURSE DESCRIPTION

This course deals with the study of structure and functions of the cell.

COURSE OBJECTIVE/S

- Understand the structures and purposes of basic components of Eukaryotic and Prokaryotic cells.
- To know the fundamental functioning of various organelles and to provide foundation for advanced courses.

COURSE OUTCOMES (CO)

By the end of the course the students will be able to:

No.	Course Outcome	Knowledge Level(According to Bloom's Taxonomy)
CO 1	Explain the different types of microscopes.	K1
CO 2	Distinguish between Eukaryotic and Prokaryotic cells.	K2
CO 3	Describe the structure and functions of cell organelles.	K2
CO 4	Outline the steps involved in cellular respiration.	K1
CO 5	Discuss the structure and functions of Nucleic acids.	K3
CO 6	Explain the processes of cell division by mitotic &meiotic phase.	K2
CO 7	Outline the characteristics of Cancer.	K2

UNIT I: TECHNIQUES IN CELL BIOLOGY [12 HRS]

Principles of microscopy - Compound microscope, Electron microscope and Phase contrast microscope-Cell fractionation – homogenization and differential centrifugation-Staining – Types of Stains – Mechanism – Metachromasia, Mordants and lakes, Vital stains – Uses.

UNIT II: STRUCTURE AND FUNCTIONS OF PLASMA MEMBRANE AND ENDOPLASMIC RETICULUM [12 HRS]

General structure and functions of Cell & Cell Organelles-Differences between Prokaryotes and Eukaryotes-Plasma Membrane – Structure, models, specializations and functions-Endoplasmic reticulum-structure and function.

UNIT III: STRUCTURE AND FUNCTIONS OF CELL ORGANELLES: [12 HRS]

Ribosomes – 70S,80S, Biogenesis of Ribosomes- Golgi Complex – Lysosomes-Centrioles - Mitochondria- Origin, Krebs cycle, Electron Transport System, Oxidative Phosphorylation.

UNIT IV: NUCLEAR COMPONENTS [12HRS]

Nucleus- Structure and function– Nucleolus – Functions of Nucleolus. Chromosomes: Structure and Types – Polytene and lampbrush: Nucleic acids – Structure – Types and Functions of DNA and RNA

UNIT V: CELL CYCLE [12 HRS]

Cell division - Cell Cycle – Types of Cell divisions - Mitosis and Meiosis-Cancer-Types, cause, symptoms and development- Oncogenes (Brief note), Cell aging.

TEXT BOOK:

Arumugam, N., (2014). Cell Biology, Tenth Edition, Saras Publication, Nagarcoil**.**

REFERENCE BOOKS:

1. Kohn N. S., (1979) Elements of Cytology, Freeman Book Co., New Delhi.

2. De Robertis E.D.P. and De Robertis. E.M.F., (1988) Cell and Molecular Biology, 8th Edition, International Edition, Hong Kong.

3. Geoffery M. Cooper and Haussmann R, (2009) The Cell*:* A Molecular Approach, Fifthedition, ASM Press and Sineur Associates, Inc.

4. Rastogi S.C., (2003). Cell and Molecular Biology - Second Edition, New Age International (P) Limited Publishers, Daryaganj, New Delhi.

5. Verma P.S. and Agarwal, V.K., (2008). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology,S. Chand & Company, New Delhi.

COURSE DESIGNER:

Dr. X. Devanya Rosaline

I SEMESTER
MAJOR PRACTICAL
LAB IN INVERTEBRATA & CELL BIOLOGY– 19Z1CC3

(For those who joined in 2019 onwards)

HOURS/WEEK: 3 **CREDIT:2**

COURSE DESCRIPTION

This Course aims to develop Identify the salient features of Invertebrates and Preparation and use of Microscopic Slides.

COURSE OBJECTIVE/S

To study the diversity of animals and to understand the fundamental organization of cells.

COURSE OUTCOMES (CO)

By the end of the course the students will be able to:

No.	Course Outcome	Knowledge Level(According to Bloom's Taxonomy)
CO 1	Recognizes the levels of organization among Invertebrates.	K1
CO 2	Illustrate the Skill of Dissection of Organisms	K2
CO 3	Recalls the Structure and Functions of Cellular Organelles.	K2
CO 4	Summarize the unique features of different Phyla among Invertebrates.	K2
CO 5	Demonstrate skill of handling Microscopes.	K2

INVERTEBRATA

1. Laboratory Biosafety guidelines and Regulations of Animal Ethics.
2. Examination of Pond water for Protists.
3. Mounting of Body setae of Earthworm.
4. Mounting of Mouth parts of Honey bee.

SPOTTERS

Amoeba, Ascon Sponge, Obelia Colony, *Taeniasolium*, *Ascaris* (Male & Female), *Nereis, Peripatus, Limulus*, Octopus, Starfish (Oral & Aboral view)

CELL BIOLOGY

1. Microscopic observation of squamous epithelial cells.
2. Microscopic observation of Cells of Onion bulb.
3. Preparation and identification of Barr body in squamous epithelial cells from Buccal cavity.
4. Preparation and identification of mitotic stages in Onion root tip.
5. Isolation of DNA from Onion bulb/ Goat Spleen. (Demonstration).

SPOTTERS

1. Compound Microscope
2. Stages of Meiosis
3. Cellular organelles – Mitochondria, Endoplasmic reticulum, Golgi complex, Nucleus

REFERENCE BOOKS:

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

COURSE DESIGNER:

Dr. Antony Amala Jayaseeli

II SEMESTER
MAJOR CORE
CHORDATA – 19Z2CC4

(For those who joined in 2019 onwards)

HOURS/WEEK: 5 **CREDIT:4**

COURSE DESCRIPTION

This course imparts knowledge on the salient features, classification and uniqueness of the Classes of Phylum Chordata.

COURSE OBJECTIVE/S

To understand the fundamental organization of Chordates and their diversity.

COURSE OUTCOMES (CO)

By the end of the course the students would be able to:

No.	Course Outcome	Knowledge Level(According to Bloom's Taxonomy)
CO 1	Recall the levels of organization among Chordates.	K1
CO 2	Bring out the general characters of Chordates.	K1
CO 3	Classify the Phyla of Chordates upto order level.	K1
CO 4	Distinguish between the Classes of Chordates.	K2
CO 5	Evaluate the unique features of each Class of Chordates.	K5
CO 6	Identify the Systematic Position of Animals.	K3

UNIT I: PHYLUM CHORDATA **[15 HRS]**

General characters & Classification up to Subclasses,
Hemichordata prochordata - Salient features & Classification
General characters & Classification of Agnatha
Origin of Chordata

UNIT II:CLASS: PISCES &CLASS: AMPHIBIA **[15 HRS]**

General characters & Classification of Class Pisces upto subclass level
Accessory Respiratory Organs in Fishes
Economic importance of fishes
General characters & Classification of Class Amphibia up to subclass level

Parental Care in Amphibians
Terrestrialization of Amphibians

UNIT III:CLASS: REPTILIA&CLASS: AVES [15 HRS]

General characters & Classification of Class Reptilia and Class Aves up to subclass level
Golden Age of Reptiles
Poisonous Snakes of South India
Flight Adaptation of birds
Migration of birds
Beaks in Birds

UNIT IV:CLASS: MAMMALIA [15 HRS]

General characters & Classification up to subclass level
Dentition in Mammals
Aquatic Mammals and their Adaptions
Adaptive Radiation of Mammals

UNIT V - COMPARATIVE STUDIES

Proto chordates – Comparison of Digestive System; Excretory System and Nervous System

Vertebrates – Comparison of Receptors Organs; Circulatory System and Urinogenital

System

TEXT BOOK:

Thangamani, A., Prasanna Kumar, S., Narayanan, L.M., Arumugam, N., 2013. A Text Book of Chordates. 6th Edition. Saras Publication, Nagercoil.

REFERENCE BOOKS:

1. Ekambaranatha Ayyar M. and Anantha krishnan, T.N. 1981, A manual of Zoology, Part-II(Chordate), Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai
2. Jordan E.L and Verma P.S 2006. Chordate Zoology, S.Chand & Co Ltd, New Delhi.
3. Prasad S.N 2005 .Vertebrate Zoology, Kitab Mahal Private Ltd , Allahabad-3.
4. Vishwanath 1967 A Text Book of Zoology Volume II [Chordates] S.Chand & Co. Madras.
5. Newman. H.H 1987. The Phylum Chordata, Satish Book Enterprise, Motikala.
6. Young J. Z. The Life of Vertebrates. Oxford University Press, New York, ed. 2, 1962.

COURSE DESIGNER:

Dr. Antony Amala Jayaseeli

II SEMESTER
MAJOR CORE
GENETICS - 19Z2CC5
(For those who joined in 2019 onwards)

HOURS/WEEK: 4 **CREDIT:3**

COURSE DESCRIPTION

This course concerned with the study of genes, genetic variation, and heredity in organisms.

COURSE OBJECTIVE/S

- Enable to understand the organization, function of genes and genetic components which are the basis of life continuum.
- Learn the concepts of sex linked and cytoplasmic inheritance.
- Explain genetic anomalies caused by changes in chromosome structure and number.

COURSE OUTCOMES (CO)

By the end of the course the students will be able to:

No.	Course Outcome	Knowledge Level(According to Bloom's Taxonomy)
CO 1	Define the different laws of Mendel.	K1
CO 2	Solve the problems related to monohybrid and dihybrid cross.	K3
CO 3	Explain the mechanism of Linkage and crossing over.	K2
CO 4	Outline the concept of sex-linked inheritance.	K2
CO 5	Discuss the types of mutation.	K2
CO 6	Explain different types of syndromes caused by chromosome abnormalities.	K1
CO 7	Identify the effective ways of diminishing the chronic genetic disorders.	K3

UNIT I INTRODUCTION TO GENETICS [12HRS]

History of Genetics, General areas of Genetics (Classical, Molecular & Evolutionary), Basis of Mendelian Inheritance and Mendelian laws, Interaction of Gene - Complementary Factors, Supplementary Factor, Simple Mendelian traits in man- Genic interaction-Complementary, Supplementary and Duplicate genes-Epistasis-Dominant and Recessive.

UNIT II MULTIPLE GENE INHERITANCE, LINKAGE AND CROSSING OVER [12HRS]

Multiple gene inheritance: Skin colour in man, Colour of wheat Kernel, Eye colour in Drosophila, Coat colour in cattle, Height in man. Blood Groups and their inheritance in Human - Linkage and Crossing over – Drosophila - Morgan's experiments - Complete and Incomplete linkage, Linkage groups, Crossing over types, Mechanisms - Cytological evidence for Crossing over.

UNIT III SEX DETERMINATION AND SEX LINKED INHERITANCE [12HRS]

Sex Determination in Man - Sex Linked Inheritance- Colour Blindness and Haemophilia in Man - Types of Sex linked inheritance - Sex influenced and Sex limited genes. Non Disjunction and Gynandromorphs. Cytoplasmic inheritance - Maternal effect on *Limnaea* (Shell Coiling), Kappa Particles in *Paramecium*.

UNIT IV MUTATION AND CHROMOSOMAL ABBERATIONS [12HRS]

Gene mutation –Types. Mutagens – Mechanisms, Mode of action. Chromosomal Aberrations – Polyploidy, Aneuploidy and mixoploidy. Syndromes- Down's, Turner, Klienfelter.

Unit V: KARYOTYPING AND GENETIC COUNSELLING [12HRS]

Karyotype-preparation of karyotype and spectral karyotype technique, Idiogram. Eugenics: Definition, Negative and Positive. Euthenics: Definition and methods- Outbreeding-Euphenics-Genetic counselling: Aim, purpose, family pedigree and preventive measures.

TEXT BOOK

1. Meyyan R, (2009). Genetics, Saras Publication, 3rd Edition, Kanyakumari

REFERENCE BOOKS:

1. Verma, P.S. and P.K. Agarwal, (2009) Genetics, 10th edition, S.Chand and Co., New Delhi.

2. James D. and Watson, (2008). Molecular Biology of the Gene, W. A. Benjamin Publishers, California.

3. William.S and Klug, (2009).Essentials of Genetics, 7th edition, Benjamin Cummings Publisher, New York.

4. Gardner, Simmond and Snustad, (2006). Principles of Genetics, John Wiley & Sons, 8th edition, New York.

COURSE DESIGNER:

Dr. X. Devanya Rosaline

II SEMESTER
MAJOR PRACTICAL
LAB IN CHORDATA & GENETICS – 19Z2CC6
(For those who joined in 2019 onwards)

HOURS/WEEK: 3 **CREDIT:2**

COURSE DESCRIPTION

Focuses on understanding the uniqueness of Chordates and genetic inheritance of characters in Man

COURSE OBJECTIVE/S

- To study the diversity of animals and to understand thefundamental organization of Genetic materials.

COURSE OUTCOMES (CO)

By the end of the course the students will be able to:

No.	Course Outcome	Knowledge Level(According to Bloom's Taxonomy)
CO 1	Recognizesthe levels of organization among Chordates.	K1
CO 2	Bring out the general characters of Chordates.	K1
CO 3	Classify Chordates upto class level.	K2
CO 4	Summarize the unique features of each Class of Chordates.	K3
CO 5	Distinguish the Mendelian Traits as Dominant and Recessive.	K3
CO 6	Develops the skill of dissecting organisms and displaying.	K3
CO 7	Interprets the Pedigrees.	K2

CHORDATA

1. Mounting of Ctenoid / Placoid scale.

2. Dissection of Frog Viscera using virtual dissection software.
3. Visit to Coastal area.
4. Study of different types of feathers of Birds.

SPOTTERS

Prochordata – Amphioxus (entire); Chordata – Anguilla (Eel), Narcine, Shark, Toad (Bufo), Hyla, Ichthyophis, Cobra, Viper, Enhydrina, Chamaeleon, Draco, Chelone, Echidna, Manis, Bat.

GENETICS

1. Preparation and identification of Salivary gland Polytene Chromosomes from *Chironomus* larva.
2. Observation of Simple Mendelian Traits in the class
3. Ishihara Test - Test for Colour blindness.
4. Pedigree analysis – a study of mode of inheritance in man

SPOTTERS

1. ABO Blood Grouping
2. Rh Factor & Erthroblastosis foetalis
3. Syndromes - Down syndrome, Turner syndrome & Klinefelter syndrome.

REFERENCE BOOKS:

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

COURSE DESIGNER:

Dr. Antony Amala Jayaseeli

SEMESTER I & II
NON-MAJOR ELECTIVE
MATERNITY AND CHILD HEALTH
19Z1NME/19Z2NME
(Offered to other major students)
(For those who joined in 2019 onwards)

HOURS/WEEK: 2 **CREDIT:2**

COURSE DESCRIPTION

This course intends to create awareness on women health problems and solutions and common problems and antenatal care during pregnancy. It aims to educate on public health, personal hygiene, and nutrition for children and pregnant mother.

COURSE OBJECTIVE/S

To understand the physiology of human reproductive system and to be aware of the significance of personal health, hygiene and Family Planning methods

COURSE OUTCOMES (CO)

By the end of the course the students would be able to:

No.	Course Outcome	Knowledge Level (According to Bloom's Taxonomy)
CO 1	List male and female reproductive organs	K1
CO 2	Discuss the various women health related issues	K2
CO 3	Associate the hormonal secretions with the different phases of menstruation cycle	K3
CO 4	Recall the warning signals of pregnancy	K1
CO 5	Discuss the major and minor problems during pregnancy	K3
CO 6	Classify the family planning methods with examples	K2
CO 7	Outline the immunization schedule	K1

CO 8	Describe the causes, symptoms, diagnosis and treatment of six killer diseases and sexually transmitted diseases	K2

UNIT I: REPRODUCTIVE SYSTEM AND WOMEN HEALTH [6 HRS]

Human male reproductive system - Female reproductive system - Menstrual Cycle – Women Health Problems: endometriosis, cervical cancer, Polycystic Ovary Syndrome (PCOS), Uterine Fibroids, Premenstrual Syndrome (PMS), Post-natal depression (PND), Menopause.

UNIT II: PREGNANCY [6 HRS]

Care during pregnancy - Warning signals of pregnancy - Major and minor problems of pregnancy, preventive measures. Family planning methods (Temporary and permanent methods)

UNIT III: NUTRITION AND IMMUNIZATION [6 HRS]

Significance of breast-feeding - Supplementary food for the pregnant and lactating mother, children from age 0-5 - Immunization schedule for children and mother.

UNIT IV: DISEASES [6 HRS]

Causative agent, symptoms, diagnosis, treatment and prevention of six killer diseases of children: Whooping Cough, Tetanus, Diphtheria, TB, Measles, and Polio. Infantile diarrhoea and control measures - Oral Rehydration Therapy (ORT).

UNIT V: HEALTH AND HYGIENE [6 HRS]

Personal health and hygiene – Urinary Tract Infection - Sexually Transmitted Diseases – Mode of Transmission, symptoms and prevention of Syphilis, Gonorrhoea and AIDS.

REFERENCE BOOKS:

1. Park J.E., Park K., (1991). Park's Text book of preventive & social medicine, 13th edition, M/S Banasidas, Bhanot Publishers, Jabalpur.
2. Werner D, Thuman C and Jane M (1992). Where there is no doctor – A health care handbook, 2nd ed., Hesperian Health Guides, US.
3. Documentaries from Gandhigram and TINIP Centre
4. Guest Lectures from Family Planning Association of India

COURSE DESIGNER:

Dr. J. Asnet Mary

II B.Sc.

SEMESTER – III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z3CC7	HUMAN PHYSIOLOGY	Lecture	5	4

COURSE DESCRIPTION

The course focuses on the complex organization of different organ systems and their functions.

COURSE OBJECTIVE

- To understand the structure and functions of digestive, respiratory, circulatory, urinogenital, neuromuscular system and sense organs.
- To introduce the physiological concepts of Homeostasis and control mechanisms.
- Learning in depth about the structure and functions of various Endocrine glands

UNITS

UNIT –I DIGESTIVE SYSTEM (15 HRS.)

Structure and Functions of digestive system - Buccal glands, Gastric, Intestinal glands, Liver and their functions - Mechanical and chemical digestion of food: Buccal, Gastric and Intestinal digestion - Important digestive enzymes for CHO, Protein, lipids- Absorption of minerals, and vitamins - Hormonal control of secretion of enzymes in gastrointestinal tract. Symptoms and causes of - Peptic ulcer, Gastroparesis, Constipation, Irritable Bowel Syndrome (IBD) Hemorrhoids.

Self Study - Structure and Functions of digestive system

UNIT –II RESPIRATORY SYSTEM AND CIRCULATORY SYSTEM (15

HRS.)

Histology of trachea and lung - Respiration and Respiratory muscles- Respiratory pigment- Pulmonary Respiration – Mechanism of Respiration- Transport of O2- Oxygen dissociation curve and Bohr effect-Transport of CO2 –Chloride Shift - carbon monoxide poisoning - Rate & Control of Respiration-BMR, RQ, Anoxia and Hypoxia (Definitions only) - Respiratory disorder - Cyanosis, Apnoea, Asthma, Pneumonia. Composition of Blood – Plasma and Corpuscles- Blood clotting Structure and functions of human heart - Haemodynamic principle--Cardiac Cycle. Symptoms and causes of - Stroke - Coronary heart disease - Hypertension - Myocardial infarction.

Self Study - Respiratory pigment

UNIT –III UROGENITAL SYSTEM (15 HRS.)

Renal function – Mechanisms of urine formation – Hormonal control-Urinary bladder – Regulation of water balance - Regulation of acid-base balance- Micturition – Dialysis.

Female Reproductive system and Functions of female sex organs: - Role of Hormones in pregnancy and parturition .Symptoms and causes of - Haematuria, Urinary tract infection, Hypospadias, Interstitial cystitis, Endometriosis .

Self Study - Renal function

UNIT –IV NEUROMUSCULAR SYSTEM (15 HRS.)

Structure of skeletal, non-striated and cardiac muscles- Structure and Properties of muscle – Skeletal, Non-striated & Cardiac-Physiology of skeletal muscle contraction-Electro kinematic theory and Sliding Filament theory. Muscular disorder - Muscular dystrophy, Fibromyalgia

Structure and functions of Neuron- Reflex Action-Reflex Arc-Chemical co-ordination- Synaptic Transmission. Symptoms and causes of– Alzheimer's diseases.

Self Study - Structure and functions of Neuron

UNIT –V HORMONES AND SENSE ORGANS (15 HRS.)

Endocrine glands and their secretions – Structure and Functions of Pituitary, Thyroid, Parathyroid, Pancreas- islets of langerhans, Adrenal glands and. b). Sense organ – Eye – Anatomy & Physiology of Vision – Myopic retinopathy and Glaucoma. Ear –Structure and Functions – Cholesteatoma - Crohn's disease.

Self Study - Sense organ - Eye - Ear general function

TEXT BOOK:

1. Vijaya D.J., (2001). *Prep Manual For Undergraduates Physiology*. 2nd edition, Churchill Livingstone, New Delhi.

REFERENCES:

1. Kashyap. V., (2019). *A text book of Animal Physiology and Biochemistry*. Kedar Nath Ram Nath, Meerut.
2. Silverthorn D.U., (2016). *Human Physiology an Integrated Approach*. 6th edition, Pearson Education Services, Pvt. Limited.
3. Suresh R., (2012). *Essentials of Human physiology*. Regional Institute of Medical Sciences, Imphal, Manipur.
4. Sherwood L., (2009). *Principles of Human Physiology*. 3rd edition, Cengage Learning India private Limited, New Delhi.
5. Sarada S., & Madhavan K. K., (2004). *Textbook of Human Physiology*, Revised by H.D. Singh, 6th edition, S. Chand and Company Ltd., New Delhi,
6. Parker S., (1996). *Human Body-Eyewitness Science Book*, Dorling Kindersley Ltd., London,
7. Das P.K., (1995). *Hand-Book of Human Physiology, 1st* edition. Current Books International, Calcutta,
8. Vidya R., (1993). *Handbook of Human Physiology, 7th* edition, Jaypee Brothers Medical Publishers Pvt. Ltd.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 DIGESTIVE SYSTEM				
1.1	Structure and Functions of digestive system	1	Discussion	Black Board
1.2	Buccal glands, Gastric glands and their functions	2	Chalk & Talk	LCD
1.3	Intestinal glands, Liver and their functions	3	Lecture	PPT & White board
1.4	Mechanical and chemical digestion of food: Buccal, Gastric & Intestinal digestion	2	Lecture	Black Board
1.5	Important digestive enzymes for CHO, Protein, lipids.	2	Lecture	LCD
1.6	Absorption of minerals, and vitamins.	1	Discussion	Google classroom
1.7	Hormonal control of secretion of enzymes in gastrointestinal tract	2	Chalk& Talk	Black Board
1.8	Symptoms and causes of - Peptic ulcer, Gastroparesis, Constipation,	1	Lecture	Black Board
1.9	Symptoms and causes of Irritable Bowel Syndrome (IBD) Hemorrhoids	1	Lecture	PPT
UNIT -2 RESPIRATORY SYSTEM AND CIRCULATORY SYSTEM				
2.1	Histology of trachea and lung.	1	Lecture	Green Board Charts

2.2	Respiration and Respiratory muscles-Respiratory pigment.	2	Discussion	Green Board
2.3	Pulmonary Respiration.	1	Lecture	PPT & White board
2.4	Mechanism of Respiration-Transport of O2- Oxygen dissociation curve and Bohr effect.	1	Chalk& Talk	Black Board
2.5	Transport of CO2 –Chloride Shift - carbon monoxide poisoning	1	Discussion	Google classroom
2.6	Rate & Control of Respiration-BMR, RQ, Anoxia and Hypoxia (Definitions only).	1	Chalk& Talk	Black Board
2.7	Respiratory disorder - Cyanosis, Apnoea, Asthma & Pneumonia.	1	Discussion	Google classroom
2.8	Composition of Blood – Plasma and Corpuscles.	2	Chalk& Talk	Black Board
2.9	Blood clotting.	1	Chalk& Talk	LCD
2.10	Structure and functions of human heart.	1	Lecture	PPT & White board
2.11	Haemodynamic principle--Cardiac Cycle.	1	Chalk& Talk	Black Board
2.12	Symptoms and causes of - Stroke - Coronary heart disease	1	Lecture	PPT & White board
2.13	Symptoms and causes of Hypertension - Myocardial infarction	1	Lecture	PPT & White board
UNIT -3 UROGENITAL SYSTEM				
3.1	Renal function	1	Discussio	Black

			n	Board
3.2	Mechanisms of urine formation	1	Chalk & Talk	LCD
3.3	Hormonal control	2	Lecture	PPT &
3.4	Urinary bladder Micturition – Dialysis.	1	Lecture	LCD
3.5	Regulation of water balance - Regulation of acid-base balance-	2	Lecture	Black Board
3.6	Urinary bladder, Micturition – Dialysis.	1	Discussio n	Google classroom
3.7	Female Reproductive system	2	Chalk & Talk	PPT
3.8	Functions of female sex organs	1	Discussio n	Black Board
3.9	Role of Hormones in pregnancy and parturition.	1	Lecture	Black Board
310	Symptoms and causes of – Haematuria & Urinary tract infection,	2	Lecture	LCD
3.11	Symptoms and causes of - Hypospadias, Interstitial cystitis, & Endometriosis.	1	Lecture	Black Board
UNIT -4 NEUROMUSCULAR SYSTEM				
4.1	Structure of skeletal, non-striated and cardiac muscles	1	Lecture	Green Board Charts
4.2	Structure and Properties of muscle – Skeletal, Non-striated	2	Chalk & Talk	Green Board

	& Cardiac			
4.3	-Physiology of skeletal muscle contraction	2	Chalk & Talk	Black Board
4.4	Electro kinematic theory and Sliding Filament theory.	2	Chalk & Talk	LCD
4.5	Muscular disorder - Muscular dystrophy, Fibromyalgia	2	Lecture	Black Board
4.6	Structure and functions of Neuron	1	Discussio n	Green Board
4.7	Reflex Action-Reflex Ac	1	Chalk & Talk	PPT
4.8	Chemical co-ordination-Synaptic Transmission.	2	Chalk & Talk	LCD
4.9	Symptoms and causes of– Alzheimer's diseases	2	Lecture	Black Board
UNIT -5 HORMONES AND SENSE ORGANS				
5.1	Endocrine glands and their secretions.	1	Chalk & Talk	Black Board
5.2	Structure and Functions of Pituitary.	2	Chalk & Talk	LCD
5.3	Structure and functions of Thyroid & Parathyroid.	4	Lecture	PPT & White board
5.4	Structure & functions of Pancreas- islets of langerhans,	1	Lecture	Black Board
5.5	Structure and functions of Adrenal glands	1	Lecture	Black Board
5.6	Sense organ – Eye – Anatomy & Subtopics	1	Discussio n	Google classroom
5.7	Physiology of Vision – Myopic retinopathy and Glaucoma.	2	Chalk & Talk	LCD

5.8	General functions of eye and ear	1	Discussion	Black Board
5.9	Cholesteatoma & Crohn's disease.	2	Discussion	PPT

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests
C2 – Average of Two Monthly Tests
C3 - Mid Sem Test
C4 – Best of Two Weekly Tests
C5 – Non - Scholastic

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	Summarize the basic components and functions of the digestive system and their disorders	K2	PSO1
CO 2	Organise major organs of the	K3	PSO4

	respiratory functions and their diseases		
CO 3	Describe circulatory system and their functions	K3	PSO8
CO 4	List the male and female urinogenital system	K1	PSO 4
CO 5	Explain the functional role of neuromuscular system	K2	PSO 1
CO6	Identify the physiological and biochemical role of hormones	K3	PSO 11
CO7	Outline the structure and mechanism of the sense organs	K2	PSO1

COURSE DESIGNER:

Dr. Sr. Biji Cyriac

II B.Sc. Zoology

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z3CC8	ENVIRONMENTAL BIOLOGY	Major Theory	4	3

COURSE DESCRIPTION

Review of ecological concepts to the understanding of Environmental biology.

COURSE OBJECTIVES

Appreciation of relationships between Environmental biology and other disciplines within Environmental biology.

UNIT –I ECOSYSTEM (12HRS.)

Definition, structure and types of ecosystem. Dynamics of ecosystem: Energy, primary production, food chain, food web, trophic level, ecological pyramids. Brief account of Pond, River, Marine, Forest, Grassland, Desert ecosystem.

Self-study _ food chain, food web, Brief account of Pond ecosystem

UNIT –II POPULATION ECOLOGY (12HRS.)

Characteristics of population: Density, Natality, Mortality, Age distribution, Population growth - survivorship curve, biotic potential, dispersal and dispersion of population, Regulation, Population interactions: Neutralism, symbiosis, antibiosis, parasitism, predation, competition – Gause's principle.

UNIT –III COMMUNITY & NATURAL RESOURCES (12 HRS.)

Characteristics of community: Structure, concept, stratification, ecotone & Edge effect, Ecological Niche, Ecological Succession: process – theory –

types, patterns. Natural resources: Types, Soil resources: Profile, soil erosion and management.

UNIT –IV BIODIVERSITY (12HRS.)

Biodiversity: Definition, types: Genetic, species, ecosystem **–** bio-geographical classification of India – value of biodiversity – threats – endangered – endemic – hotspots – conservation of biodiversity – types, wildlife conservation, biosphere reserves. Brief account on remote Sensing: types and applications.

UNIT –V ENVIRONMENTAL POLLUTION (12 HRS.)

Definition, Causes, effects and control measures of Air, Water, Soil, Noise, and Nuclear pollution. Case studies: Bhopal episode, stone leprosy, Minamata disease, Chernobyl episode – Role of an individual in prevention of pollution – Environmental Protection Act- Salient features

Self Study _ Case studies: Bhopal episode, stone leprosy, Minamata disease, Chernobyl episode – Role of an individual in prevention of pollution

TEXT BOOK:

1. Arumugam N., (2014). *Concepts of Ecology*. Saras Publication. Nagercoil.
2.Asthanks D.K., & Asthana. M.A., (2009). *TextBook of Environmental Studies*. S. Chand & Company Ltd.
3.Krishnamurthy K.V., (2007). *An Advanced Textbook on Biodiversity.* 4th Edition, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.

REFERENCES

1. Odum E.P., & Barrett G.W., (2009). *Fundamentals of Ecology*.5th Edition, Binding House, New Delhi.
2. Rans S.V.S., (2007). *Essentials of ecology and Environmental Science*. 3rd Edition, Prentice-Hall of India Private Limited, New Delhi.

3. Cunningham W.P., & Cunningham M.A., (2008). *Environmental Science- a global concern.* 10th Edition McGraw Hill International, Boston.
4. Chatterji A.K., (2005). *Introduction to Environmental Biotechnology*. Prentice-Hall of India Private Limited, New Delhi.
5. Anand S.B., (2005). *An Introduction to Environmental Management.* Himalaya Publishing House, Mumbai.
6. Ignacimuthu S.J., (2012).*Environmental Studies*. MJP Publishers,Chennai.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
UNIT -1	**ECOSYSTEM**			
1.1	Definition, structure of ecosystem.	2	Chalk & Talk	Black Board
1.2	Dynamics of ecosystem: Energy, primary production, food chain, food web,	2	Chalk & Talk	Black Board
1.3	trophic level, ecological pyramids.	2	Lecture	PPT
1.4	Brief account of Pond, River ecosystems	2	Chalk & Talk	Black Board
1.5	Marine, Forest	2	Lecture	PPT
1.6	Grassland, Desert ecosystem	2	Lecture	PPT
UNIT -2	**POPULATION ECOLOGY**			
2.1	Characteristics of population: Density, Natality, Mortality	2	Lecture	LCD

2.2	Age distribution, Population growth - survivorship curve, biotic potential	2	Chalk & Talk	Green Board
2.3	dispersal and dispersion of population, Regulation	2	Lecture	PPT
2.4	Population interactions: Neutralism, symbiosis	2	Chalk & Talk	Black Board
2.5	antibiosis, parasitism	2	Lecture	PPT
2.6	predation, competition Gause's principle	2	Chalk & Talk	Green Board
UNIT - 3 COMMUNITY & NATURAL RESOURCES				
3.1	Characteristics of community: Structure, concept, stratification	2	Chalk & Talk	Green Board
3.2	Ecotone, Edge effect, Ecological Niche	2	Lecture	PPT
3.3	Ecological Succession: process – theory – types	2	Chalk & Talk	Green Board
3.4	Ecological Succession - patterns.	2	Lecture	PPT
3.5	Natural resources: Types	2	Chalk & Talk	Green Board
3.6	Soil resources: Profile, soil erosion and management.	2	Chalk & Talk	Black Board
UNIT -4 BIODIVERSITY				
4.1	Biodiversity: Definition, types: Genetic, species, ecosystem	2	Chalk & Talk	Green Board
4.2	bio-geographical classification of India – value of biodiversity	2	Chalk & Talk	Green Board

4.3	threats – endangered – endemic – hotspots	2	Lecture	PPT
4.4	– conservation of biodiversity – types,	2	Chalk & Talk	Black Board
4.5	wildlife conservation, biosphere reserves.	2	Lecture	PPT
4.6	Brief account on remote Sensing: types and applications.	2	Chalk & Talk	Green Board
UNIT -5 ENVIRONMENTAL POLLUTION				
5.1	Definition, Causes, effects and control measures of Air, Water pollution	3	Chalk & Talk	Green Board
5.2	Definition, Causes, effects and control measures Soil,Noise,	3	Lecture	PPT
5.3	Definition, Causes, effects and control measures Nuclear pollution	2	Chalk & Talk	Black Board
5.4	. Case studies: Bhopal episode, stone leprosy, Minamata disease, Chernobyl episode –	3	Lecture	PPT
5.5	Role of an individual in prevention of pollution –	1	Chalk & Talk	Green Board
5.6	Environmental Protection Act- Salient features	1	Chalk & Talk	Green Board

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**

	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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	Explain the structure and function of the Ecosystems	K1	PSO1& PSO2
CO 2	Compare and contrast different types of Ecosystem	K2	PSO2&PSO3
CO 3	List the value of soil ecosystem services.	K1	PSO3,PSO2& PSO5
CO 4	Identify the nature and interactions of populations in the ecosystem	K1	PSO6& PSO2
CO 5	Explain the method of population limitations	K2	PSO2& PSO2
CO 6	Identify how a stable climax community is formed in an ecosystem	K3	PSO1& PSO2

CO 7	Infer the importance of Biodiversity and its conservation	K3	PSO6& PSO2
CO 8	Show the consequences of Human actions on global environment	K2	PSO5& PSO2

COURSE DESIGNER:
Dr.V. Bharathy

II B.Sc. (ZOOLOGY)

SEMESTER – III (MAJOR PRACTICAL

LAB IN HUMAN PHYSIOLOGY & ENVIRONMENTAL BIOLOGY)

For those *who joined in 2019 onwards*

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z3CC9	LAB IN HUMAN PHYSIOLOGY & ENVIRONMENTAL BIOLOGY	MAJOR 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

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

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

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 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

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average 5 Mks.	**Better of W1, W2 5 Mks**	**M1+M2 5+5=10 Mks.**	**MID-SEM TEST 15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

✔ **All the course outcomes are to be assessed in the various CIA components.**

✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

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

CO 1	Identify the different types of zooplanktons	K1	PSO1
CO 2	Recall the preparation haemin crystal	K1	PSO2
CO 3	Estimate the dissolved O_2 and CO_2 in given water samples	K2	PSO3
CO 4	Infer the qualitative estimation of protein	K2	PSO2
CO 5	Interpret the Qualitative analysis of urea, ammonia and creatinine	K2	PSO2
CO 6	Demonstration on ECG, BMI Chart	K3	PSO10
CO 7	Interpret hormonal disorder	K3	PSO1 & PSO2

COURSE DESIGNER

Dr. Sr.Biji Cyriac

II B.Sc.

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	**19Z3SB1**	**Vermitechnology**	**Lecture**	**2**	**2**

COURSE DESCRIPTION

This course imparts knowledge on the culture of earthworms and the preparation of vermicompost by recycling the waste through teaching and fieldtrip and eventually motivate the learners to become an entrepreneur

COURSE OBJECTIVES

- To impart the knowledge on the biology of earthworms
- To foster the skills on the preparation of quality vermicompost by recycling the waste
- To understand the prospects and marketing strategies of vermitechnology

UNIT I BIOLOGY OF EARTHWORMS (6HRS.)

Biology of earthworms : Morphology, Digestive and reproductive system of earthworms. Lifecycle of Earthworms: *Eudrilus eugenia*, *Eisenia fetida*, *Perionyx excavatus*.

Self –study - : Morphology, Digestive and reproductive system of earthworms

UNIT II ECOLOGICAL GROUPS (6HRS.)

Ecological groups of earthworms: Saprophages, geophages, humus feeders – Epigeic, endogeic, anecic – earthworm burrows, vermicasts, vermiwash. Importance of earthworm in agriculture, fishing, therapeutics and pollution indicators.

UNIT III VERMICOMPOSTING METHODS (6HRS.)

Vermicomposting – definition, types: small and large scale, pit method, heap method, windrow method, collection of vermicompost - Raw materials for composting – requirements of vermicomposting - factors affecting vermicomposting: pH, moisture, temperature, nutritional value of feed.

UNIT IV: PROPERTIES OF VERMICOMPOST (6HRS.)

Physical, chemical and biological properties of vermi-compost. Role of earthworms in composting – vermiculture. Maintenance of composting – Predators of earthworm

UNIT V: ECONOMICS AND PROSPECTS (6HRS.)

Advantages of vermicomposting – economics of vermiculture – NABARD Nationalized banks supports for vermiculture. Prospects of vermiculture as self employment venture

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

REFERENCE BOOKS

1. Sultan A I. The Earthworm Bo. Second Revised Edition .Other India Press, Mapusa - 403 507, Goa, 2005.
2. Christy, A.M.V. Vermitechnology, MJP publishers, Chennai, 1976.
3. Bhatnagar R.K. & PaltaR.K. “Earthworm Vermiculture and Vermicomposting”, Kalyani Publishers, Chennai
4. GuptaP.K. “Vermi Composting for Sustainable Agriculture“, AGROBIOS (India), Jodhpur

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT I BIOLOGY OF EARTHWORMS				
1.1	Biology of earthworms - Morphology	1	Chalk & Talk	Black Board
1.2	Biology of earthworms- Digestive system	1	Chalk & Talk	Black Board
1.3	Biology of earthworms- reproductive system	1	Lecture	PPT & White board
1.4	Lifecycle of Earthworms: *Eugenia* e*udrilus*	1	Chalk & Talk	Black Board
1.5	Lifecycle of Earthworms: *Eisenia fetida*,	1	Discussion	Google Classroom
1.6	Lifecycle of Earthworms: *Perionyx excavatus*.	1	PPT	LCD &White Board
UNIT II ECOLOGICAL GROUPS				
2.1	Ecological groups of earthworms: Saprophages	1	Chalk & Talk	Green Board
2.2	Ecological groups of earthworms: geophages	1	Chalk & Talk	Black Board
2.3	Ecological groups of earthworms: humus feeders	1	Chalk & Talk	Black Board

2.4	Epigeic, endogeic, anecic – earthworm burrows	1	Chalk & Talk	Black Board
2.5	Vermicasts, Vermiwash	1	Lecture	PPT
2.6	Importance of earthworm in agriculture, fishing	1	Lecture	PPT
UNIT III VERMICOMPOSTING METHODS				
3.1	Vermicomposting – definition, types: small and large scale	1	Chalk & Talk	Black Board
3.2	Vermicomposting Types:Pit method, Heap method, Windrow method	1	Lecture	PPT & White board
3.3	Collection of vermicompost	1	Lecture	LCD
3.4	Raw materials for composting	1	Lecture	LCD
3.5	Requirements of vermicomposting & nutritional value of feed	1	Lecture	LCD
3.6	Factors affecting vermicomposting: pH, moisture, temperature	1	Lecture	PPT & White board
UNIT IV: PROPERTIES OF VERMICOMPOST				
4.1	Physical, properties of vermi-compost	1	Chalk & Talk	Black Board

4.2	Chemical properties of vermi-compost	2	Lecture	LCD
4.3	Biological properties of vermi-compost	1	PPT	LCD &White Board
4.4	Role of earthworms in composting vermiculture	2	Lecture	LCD
4.5	Maintenance of composting	1	Lecture	LCD
4.6	Predators of earthworm	1	Chalk & Talk	Black Board
UNIT V: ECONOMICS AND PROSPECTS				
5.1	Advantages of vermicomposting	1	Chalk & Talk	Black Board
5.2	Economics of vermiculture	2	Chalk & Talk	Black Board
5.3	NABARD Nationalized banks supports for vermiculture	1	Chalk & Talk	Black Board
5.4	Prospects of vermiculture as self employment venture	2	Lecture	LCD

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average	**Better of W1, W2**	**M1+M2**	**MID-SEM TEST**				

	5 Mks.	5 Mks	5+5=10 Mks.	15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC	**NON -**	**MARKS**

				SCHOLASTIC			
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Identify the different species of earthworm	**K1**	PSO1
CO 2	Explain the Biology of earthworms	**K1**	PSO2 & PSO4
CO 3	Classify the ecological group of earthworms	**K2**	PSO1& PSO4
CO 4	Elucidate the role of earthworm in diverse applications	**K2**	PSO2
CO 5	Describe the Physical, Chemical and Biological properties of Vermicompost	**K1**	PSO6

CO 6	Distinguish between Vermicompost, Vermiwash and Vermicast	**K2**	PSO6
CO 7	Summarize the methods of Vermicomposting	**K2**	PSO1
C0 8	Analyse the economics and prospects of vermiculture as self employment avenues	**K3**	PSO10

COURSE DESIGNER:
Dr.N.Malathi

II B.Sc. Zoology

SEMESTER –III PLANT DIVERSITY & PLANT PATHOLOGY

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z3ACQ1	PLANT DIVERSITY & PATHOLOGY	Allied Theory	3	3

COURSE DESCRIPTION

To understand the structure & life cycle of Plant groups

COURSE OBJECTIVES

To gain knowledge on Algae, Fungi, Plant diseases and to understand the usage of economically important locally available plants

UNIT –I ALGAE & FUNGI (9 HRS.)

General Characters of Algae – Type study - Structure and life history of *Sargassum* – Economic importance of Algae; General characters of Fungi - Type study - Structure and life history of *Puccinia*- Economic importance of Fungi

Self-study- Economic importance of Fungi

UNIT –II LICHENS & PLANT PATHOLOGY (9 HRS.)

General Characters of Lichens – Type study - Structure and Reproduction of *Usnea*-Economic importance of Lichens - Causative Organism, Symptoms and Control Measures of the following diseases: Viral disease-Bunchy Top of Banana; Bacterial disease-Citrus Canker; Fungal disease - Tikka disease of Groundnut

Self-study- Economic importance of Lichens

UNIT –III BRYOPHYTES, PTERIDOPHYTES & GYMNOSPERMS (9 HRS.)

General characters of Bryophytes, Pteridophytes and Gymnosperms - Type study - Structure and life history of *Anthoceros* ,Structure and life history of *Lycopodium and* Structure and life history of *Cycas*(Development of sex organs need not be studied)

UNIT –IV TAXONOMY OF ANGIOSPERMS (9 HRS.)

Units of classification, Binomial Nomenclature - Bentham and Hooker's classification with reference to the following families Rutaceae, Caesalpiniaceae, Asclepiadaceae, Euphorbiaceae and Poaceae

Self-study- Binomial Nomenclature

UNIT –V ECONOMIC BOTANY (9 HRS.)

Brief study of the following economic products with special reference to the botanical name, family and morphology of the useful part and its uses

Cereals	-	Paddy
Pulses	-	Black gram
Fruits	-	Mango
Beverages	-	Coffee
Narcotics	-	Tobacco
Spices and condiments	-	Cinnamon
Fibers	-	Cotton
Latex	-	Rubber
Wood	-	Teak wood
Biodiesel	-	*Jatropha*

Self-study- Cereals - Paddy,Wood-Teak wood

TEXT BOOKS:

1. Narayanaswamy R.V. & Rao K.N. *Outlines of Botany*. S. Viswanathan (Printers and Publishers) Pvt. Ltd., Madras (1984).
2. Kumarasen.V& Ragland. A. *Taxonomy of Angiosperm*. Saras Publication, Nagercoil (2004).

3. Pandey B.P. *A text Book of Botany*. Chand and Company Ltd.Ramnagar,New Delhi (2000).
4. Pandey, B.P. *Taxonomy of Angiosperm*. Chand and Company Ltd.Ramnagar,New Delhi(2007).
5. Verma, V. *A Text Book of Economic Botany*.Ane Books Pvt. Ltd.New Delhi (2009).

REFERENCES

1. Pandey B.P., *Economic Botany*.S.Chand and Company Ltd., New Delhi(1999).
2. Vashista, B.R., *Algae*. 8th Edition, S.Chand and Company Ltd., New Delhi(2000).
3. Pandey, B.P, *Bryophyta*. 4th Edition, S. Chand and Company Ltd. New Delhi(2000).
4. Vashista, B.R., *Fungi*. 11th Edition, S. Chand and Company Ltd. New Delhi (2000).
5. Vashishta B.R., *Pteridophyta*. S. Chand and Company Ltd. New Delhi (2010).
6. Vashishta. B.R., *Gymnosperms*. S. Chand and Company Ltd. New Delhi (2010).
7. Lawrence, G.H.M.,*Taxonomy of Vascular Plants.* Scientific Publishers India. (2012)

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1ALGAE& FUNGI				
1.1	General Characters of Algae	1	Chalk &	Black

			Talk	Board
1.2	Type study - Structure and life history of *Sargassum*	2	Lecture	PPT
1.3	Economic importance of Algae	1	Chalk & Talk	LCD
1.4	General characters of Fungi	2	Lecture	PPT & White board
1.5	Type study - Structure and life history of *Puccinia*	2	Lecture	Smart Board
1.6	Economic importance of Fungi	1	Lecture	Black Board
UNIT -2	**LICHENS AND PLANT PATHOLOGY**			
2.1	General Characters of Lichens	2	Lecture	Green Board Charts
2.2	Type study - Structure and Reproduction of *Usnea*-	3	Chalk & Talk	Green Board
2.3	Economic importance of Lichens	1	Chalk & Talk	Black Board
2.4	Causative Organism,Symptoms and Control Measures of the following diseases: Viral disease-Bunchy Top of Banana	1	Lecture	PPT
2.5	Bacterial disease-Citrus Canker	1	Chalk & Talk	LCD
2.6	Fungal disease - Tikka disease of Groundnut	1	Chalk & Talk	Black Board
UNIT -3 BRYOPHYTES, PTERIDOPHYTES & GYMNOSPERMS				
3.1	General characters of Bryophytes	1	Lecture	PPT
3.2	Pteridophytes	1	Chalk &	LCD

			Talk	
3.3	Gymnosperms	1	Lecture	PPT
3.4	Type study - Structure and life history of *Anthoceros*	2	Chalk & Talk	LCD
3.5	Structure and life history of *Lycopodium*	2	Lecture	PPT & White board
3.6	Structure and life history of *Cycas*(Development of sex organs need not be studied)	2	Lecture	PPT
UNIT -4 TAXONOMY OF ANGIOSPERMS				
4.1	Units of classification, Binomial Nomenclature	1	Discussion	Black Board
4.2	Bentham and Hooker's classification	2	Chalk & Talk	Specimen, Black Board
4.3	Rutaceae	1	Chalk & Talk	Specimen, Black Board
4.4	Caesalpiniaceae	1	Chalk & Talk	Specimen, Black Board
4.5	Asclepiadaceae	2	Chalk & Talk	Specimen, Black Board
4.6	Euphorbiaceae	1	Chalk & Talk	Specimen, Black Board
4.7	Poaceae	1	Chalk & Talk	Specimen, Black Board
UNIT -5ECONOMIC BOTANY				
5.1	Brief study of the following economic products with special	2	Lecture	Specimen,

	reference to the botanical name, family and morphology of the useful part and its uses Cereals - Paddy, Pulses-Black gram			PPT
5.2	Fruits - Mango Beverages - Coffee	2	Chalk & Talk	Specimen, LCD
5.3	Narcotics Tobacco, Spices and condiments - Cinnamon	2	Lecture	Specimen PPT
5.4	Fibers - Cotton, Latex - Rubber	1	Chalk & Talk	Specimen Specimen
5.5	Wood Teak wood, Biodiesel - *Jatropha*	2	Chalk & Talk	Specimen

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %

K4	-	-	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	-	-	-	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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	Recognize the structure and life cycle of algae and fungi	K1	PSO2
CO 2	Identify the plant diseases with the help of symptoms and choose the control measures	K2	PSO3
CO 3	Relate the role of Lichen as pollution indicators	K2	PSO5&PSO8
CO 4	Outline the general characters of Bryophytes, Pteridophytes and Gymnosperms	K2	PSO5
CO 5	Infer the symbiotic relationship between plants and microbes in nitrogen fixation	K2	PSO5& PSO10
CO 6	Identify the binomial name with the help of vernacular or common name	K3	PSO5
CO 7	Relate the various angiospermic plants to their families	K3	PSO5
CO 8	Make use of economically important locally available plants	K1	PSO8

COURSE DESIGNER:
Dr.V. Bharathy

& Name: Dr. A. Tamil Selvi

II B.Sc.

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z3ACQ2	LAB-PLANT DIVERSITY & PATHOLOGY	Allied Practical	2	2

COURSE DESCRIPTION

To understand the structure and function of different plant groups.

COURSE OBJECTIVES

To gain knowledge in constructing sections of plant material and to understand them.

1. Micro preparations, description and identification of Algae *(Nostoc, Cladophora).*
2. Sectioning and identification of Plant diversity materials wherever applicable (*Sargassum,Puccinia, Usnea, Lycopodium* and *Cycas)*
3. Identification of Plant diseases
4. Description of the plants in technical terms belonging to the families prescribed in the syllabus using local flora.
5. Genus, species and family of economically useful plant parts wherever applicable under Economic Botany.
6. Spotters
7. Record Note

REFERENCES

1. Bendre. A . Practical Botany. Deep and Deep Publications (2009).
2. Pandey. B.P. Modern Practical Botany - Vol.1,2&3. S. Chand publications (2011).
3. Bendre. A & Kumar. A. A Text Book Of Practical Botany 2. Deep and Deep Publications (2002).
4. Vashista, B.R. Algae. 8th Edition, S.Chand and Company Ltd., New Delhi(2000).
5. Pandey, B.P. Bryophyta. 4th Edition, S. Chand and Company Ltd. New Delhi(2000).
6. Vashista, B.R. Fungi. 11th Edition, S. Chand and Company Ltd. New Delhi (2000).
7. Vashishta B.R. Pteridophyta. S. Chand and Company Ltd. New Delhi (2010).
8. Vashishta. B.R. Gymnosperms. S. Chand and Company Ltd. New Delhi (2010).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
UNIT -1	**TITLE**			
1.	Micro preparations, description and identification of Algae (*Nostoc, Cladophora*).	4	Sectioning	Specimen & Microscope
2.	Sectioning and identification of Plant diversity materials wherever applicable (*Sargassum, Puccinia, Usnea,*	12	Sectioning	Specimen & Microscope

	Lycopodium and Cycas)			
3.	Identification of Plant diseases	3	Discussion	Specimen
4.	Description of the plants in technical terms belonging to the families prescribed in the syllabus using local flora.	5	Demonstration	Specimen
5.	Genus, species and family of economically useful plant parts wherever applicable under Economic Botany.	2	Discussion	Specimen
6.	Spotters	-	Discussion	Specimen
7.	Record note	-	Discussion	Specimen

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %

Non Scholastic	-	-	-	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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
CO1	Construct suitable micro preparations	K1	PSO1, PSO2&PSO7
CO2	Construct sections of given plant materials with illustration and description	K1	PSO2,PSO3&PSO 7
CO3	Make use of dissection microscope to display the floral parts of Angiosperms	K2	PSO1,PSO2&PSO 7
CO4	Identify specimens and slides from Algae, Fungi,Lichens,Bryophytes, Pteridoplytes and Gymnosperms included in the syllabus	K2	PSO2,PSO6&PSO 7

COURSE DESIGNER:
V.Bharathy

II B.Sc.

SEMESTER –III

For II B.Sc Chemistry those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	**19C3ACZ1**	**Animal Diversity, Physiology & Genetics**	**Allied Theory**	**3**	**3**

COURSE DESCRIPTION

This course is designed for the chemistry student which discusses the branch of Zoology that deals with animal diversity, structure and function of various systems, development and inheritance of man.

COURSE OBJECTIVES

- Attain a precise knowledge on the taxonomy, diversity, anatomy and physiology all major animal phyla along with several minor phyla with an emphasis on the unique and specific features of each group.
- Understand the structure and function of digestive, excretory, reproductive and sensory systems
- Inculcate the aspect of how generations inherit and vary.

UNITS

UNIT –I ANIMAL DIVERSITY (9 HRS.)

Animal Kingdom: General characters OF Invertebrates and Chordata: outline

classification, organization, symmetry, body cavity. General characters: Protozoa, Porifera, Coelenterata, Helminthes, Annelida, Arthropoda, Molluscs, Echinodermata, Pisces, Amphibians, Reptiles, Aves and Mammalia.

Self Study- Outline classification of phyla

UNIT –II DIGESTION AND RESPIRATION (9 HRS.)

Digestion: Digestive system of human, role of salivary glands, bile and enzymes in digestion of Carbohydrates, Protein and Fat in human. Absorption of Carbohydrates, Protein and Fat. **Respiration**: External and internal respiration, Structure of Lungs. Mechanism of respiration, Respiratory pigment – Hemoglobin and Hemocyanin. Exchange and transport of gases.

Self Study – Structure of Lungs

UNIT –III CIRCULATION AND EXCRETION (9 HRS.)

Circulation: Types –open and closed, Components and functions of Blood, Structure and functions of human heart- origin and conduction of heart beat. **Excretion**: Classification of animals based on excretory products, Structure and functions of Kidney and nephron - Physiology of urine formation.

Self study –Functions of Kidney

UNIT –IV REPRODUCTION & SENSORY RECEPTORS (9 HRS.)

Reproduction: Male reproductive system – structure and Function. Female reproductive system – structure and Function - Menstrual cycle. Sensory Receptors: Photoreceptor – Structure and functions of the eye. Phonoreceptor: Structure and functions of ear.

Self Study - Anatomy of Male reproductive and Female reproductive system

Self Study – General function of Ear

UNIT –V MENDELIAN LAWS OF INHERITANCE & ALLELISM (9 HRS.)

Mendelian laws –law of Dominance, law of Segregation and Monohybrid cross, law of Independent assortment and Dihybrid Cross. Multiple Alleles – ABO blood grouping - Sex linked inheritance – X linked genes - Colour blindness, Hemophilia, Y linked genes - Sex Influenced genes – Sex limited genes.

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

Syndrome - Down Syndrome – Turner's Syndrome –Klinefelter's Syndrome

REFERENCES

1. Arumugam and Mariakuttikan, (2016). Animal Physiology, Saras publications, Nagercoil.
2. Meyyan R, (2009). Genetics. Saras Publication,3rd Edition , Kanyakumari.
3. Arumugam N., (2012) A Text book of Invertebrates, 4th edition, Saras publication, Nagercoil.
4. Jordan E.L.and Verma P.S., (2001) Invertebrate Zoology, S.Chand & Co, New Delhi.
5. Kashyap. V., (2019). A text book of Animal Physiology and Biochemistry. Kedar Nath Ram Nath, Meerut.
6. Silverthorn D.U., (2016). Human Physiology an Integrated Approach. 6th Edition, Pearson Education Services. Pvt. Limited.
7. Suresh R., (2012). Essentials of Human physiology. Regional Institute of Medical Sciences, Imphal, Manipur.
8. Sherwood L., (2009). Principles of Human Physiology. 3rd Edition, Cengage Learning India private Limited, New Delhi.
9. Sarada S., & Madhavan K. K., (2004). .Textbook of Human Physiology, Revised by H.D. Singh, 6th Edition, S. Chand and Company Ltd., New

Delhi.

10. Snustad, D.P. and Simmons, M.J., (2009). Principles of Genetics,V Edition, JohnWiley and Sons Inc.,

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**ANIMAL DIVERSITY**			
1.1	Animal Kingdom: General characters OF Invertebrates and Chordata:	1	Chalk & Talk	Black Board
1.2	Subtopics: Outline classification ,organization, symmetry, body cavity.	1	Discussion	Google classroom
1.3	General characters: Protozoa, Porifera, Coelenterata,	2	Lecture	PPT & White board
1.4	Helminthes, Annelida,	1	Lecture	Smart Board
1.5	Arthropoda, Molluscs,	1	Lecture	Black Board

1.6	Echinodermata, Pisces,	1	Lecture	Black Board
1.7	Amphibians, Reptiles,	1	Lecture	LCD
1.8	Aves and Mammalia.	1	Discussion	Black Board
UNIT -2	**DIGESTION AND RESPIRATION**			
2.1	Digestion: Digestive system of human,	1	Lecture	Green Board Charts
2.2	Role of salivary glands, bile and enzymes in digestion of Carbohydrates, Protein and Fat in human.	1	Chalk & Talk	Black Board
2.2	Absorption of Carbohydrates, Protein and Fat.	2	Chalk & Talk	Green Board
2.3	Respiration: External and internal respiration,	1	Lecture	Black Board
2.4	Structure of Lungs. Mechanism of respiration,	2	Chalk & Talk	Black Board

2.5	Respiratory pigment – Hemoglobin and Hemocyanin	1	Chalk & Talk	Black Board
2.6	Exchange and transport of gases.	1	Lecture	PPT/LCD
UNIT -3	**CIRCULATION AND EXCRETION**			
3.1	Circulation: Types –open and closed,	1	Chalk & Talk	Black Board
3.3	Components and functions of Blood,	1	Chalk & Talk	Black Board
3.4	Structure and functions of human heart-.	2	Lecture	PPT/LCD
3.5	origin and conduction of heart beat.	1	Lecture	PPT/LCD
3.6	Excretion: Classification of animals based on excretory products,	1	Chalk & Talk	Black Board
3.7	Structure and functions of Kidney and nephron -	1	Lecture	PPT/LCD

3.8	Physiology of urine formation	1	Chalk & Talk	Black Board
UNIT - 4	**REPRODUCTION & SENSORY RECEPTORS**			
4.1	Reproduction	1	Lecture	PPT/LCD
4.2	Male reproductive system – structure and Function.	2	Group Discussion	Smart Board
4.3	Female reproductive system – structure and Function	1	Group Discussion	Smart Board
4.4	Menstrual cycle.	1	Lecture	LCD
4.5	Sensory Receptors: Photoreceptor – Structure and functions of eye.	2	Chalk & Talk	Black Board
4.6	Phonoreceptor: Structure and functions of ear	2	Chalk & Talk	Black Board
UNIT - 5	**MENDELIAN LAWS OF INHERITANCE & ALLELISM**			
5.1	Mendelian laws –law of Dominance, law of Segregation	2	Chalk & Talk	Black Board

5.2	Monohybrid cross	1	Chalk & Talk	Black Board
5.3	Dihybrid Cross.	1	Lecture	LCD
5.4	Multiple Alleles – ABO blood grouping	2	Chalk & Talk	Green Board
5.5	X linked genes	1	Chalk & Talk	White board
5.6	Y linked genes	1	Lecture	LCD
5.7	Sex Influenced genes – Sex limited genes.	1	Lecture	PPT
UNIT - 6 DYNAMISM				
6.1	Down Syndrome – Turner's Syndrome –Klinefelter's Syndrome		Lecture	LCD

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average	**Better of W1, W2**	**M1+M2**	**MID-SEM TEST**				

	5 Mks.	5 Mks	5+5=10 Mks.	15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Outline the general characters with of invertebrate and chordata with reference to organization, symmetry, body cavity.	K2	PSO1& PSO4
CO 2	Explain the digestive system, role of enzymes, digestion and absorption of Carbohydrates, Protein and Fat in Man.	K2	PSO1
CO 3	Distinguish between internal and external respiration in context to the mode and transport of gas exchange.	K4	PSO1
CO 4	Summarize the structure and function of heart, Kidney, eye	K2	PSO1

	and ear.		
CO 5	Explain the Mendelian Laws Of Inheritance & Allelism	K2	PSO1

COURSE DESIGNER:
Dr.N.Nagarani

II B.Sc. Chemistry

SEMESTER –III

For II B.Sc Chemistry those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	**19C3ACZ2**	**Lab-Animal Diversity, Physiology & Genetics**	**Allied Practical**	**2**	**2**

COURSE DESCRIPTION

Students develop laboratory skills with identification of preserved specimen, manipulation of prepared slides, dissections and display under the microscope

COURSE OBJECTIVES

To study the diversity of animals and to understand the fundamental organization of cells.

INTRODUCTION

1. Laboratory biosafety guidelines and Regulations of Animal Ethics

2. Principle and handling of Compound microscope

ANIMAL DIVERSITY

1. Mounting of Body setae of Earthworm. (Collected from Vermiculture Centres)
2. SPOTTERS: Preserved Museum Specimens
3. Invertebrata - Amoeba, Ascaris (Male & Female), Prawn, Octopus, Starfish (Oral & Aboral view): Chordata – Anguilla (Eel), Toad (Bufo), Chamaeleon, Pigeon, Manis

HUMAN PHYSIOLOGY

1. Preparation and observation of blood smear
2. ABO Blood Grouping
3. Preparation of Haemin Crystals
4. Qualitative analysis of urea and uric acid in the given sample.
5. Effect of temperature on salivary amylase activity in man
6. SPOTTERS: Eye, Ear, Heart

GENETICS

1. Observation of simple Mendelian Traits in the class Population
2. SPOTTERS: Drosophila, Mule, Monohybrid cross, Syndrome

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

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
Animal Diversity				
1.1	Mounting of Body setae of Earthworm. (Collected from Vermiculture Centres)	2	Hands on Training	Specimen
1.2	Invertebrata - Amoeba, Ascaris (Male & Female), Prawn,	2	Discussion	Museum Specimen
1.3	Octopus, Starfish (Oral & Aboral view)	2	Discussion	Museum Specimen
1.4	Chordata – Anguilla (Eel), Toad (Bufo),	2	Discussion	Museum Specimen
1.5	Chamaeleon, Pigeon, Manis	2	Discussion	Museum Specimen

Human Physiology				
2.1	Preparation and observation of blood smear	1	Hands on Training	Blood Smple
2.2	ABO Blood Grouping	1	Hands on Training	Blood Grouping Kit
2.3	Preparation of Haemin Crystals	2	Hands on Training	Microscope
2.4	Qualitative analysis of urea and uric acid in the given sample.	2	Hands on Training	Specimen
2.5	Effect of temperature on salivary amylase activity in man	2	Hands on Training	Stop Clock, Water bath
2.6	SPOTTERS: Eye, Ear, Heart	2	Discussion	Museum Specimen

Genetics				
3.1	Observation of simple Mendelian Traits in the class Population	2	Hands on Training/Discussion	Black Board
3.2	SPOTTERS: Drosophila, Mule, Monohybrid cross, Syndrome	2	Discussion	Museum Specimen

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	-	-	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	-	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	-	-	**3**	**5**	**8**	-	**8**	20 %
K4	-	-	**3**	**5**	**8**	-	**8**	20 %

Non Scholastic	-	-	-	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Outline the Laboratory biosafety guidelines and good laboratory practices.	K1	PSO1, PSO2 & PSO7
CO 2	Recall the Principle of Compound microscope	K2	PSO1 & PSO2
CO 3	Dissect and mount the Body setae of Earthworm	K4	PSO4& PSO8

CO 4	List out the features of the given spotters *Amoeba, Taenia solium*, *Nereis*, *Amphioxus* (entire), *Anguilla* (Eel), Toad (*Bufo*), Cobra, Chamaeleon, Pigeon and various Syndromes.	K1	PSO1 & PSO8
CO 5	Test for the presence of carbohydrates, proteins and Lipids, Urea and Uric acid in the given sample	K4	PSO2 &PSO4
CO6	Examine the Haemin Crystal under the microscope	K4	PSO2
CO7	Recall the structure of human physiological model such as Ear, Eye and heart.	K1	PSO1

COURSE DESIGNER:
Dr.N.Nagarani

II B.Sc.

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z4CC10	MICROBIOLOGY	Lecture	5	4

COURSE DESCRIPTION

This course deals with the study of microorganisms and its interaction with the environment.

COURSE OBJECTIVES

- To understand the fundamentals of the world of Microbes, distribution and their application for human welfare.
- To understand the structural similarities and differences among various microorganisms.
- To know various types of Culture media and the techniques for isolation of pure cultures of microbes.
- Comprehend the intricate interaction between viruses and host cells.

UNIT –I INTRODUCTION TO MICROBIOLOGY (15HRS.)

The historical development and scope of Microbiology -Sterilization and disinfections - physical and chemical methods - Culture media – Types - Culture techniques – Batch, Continuous, Synchronous and Fed-batch – Methods of culturing bacteria – Isolation of bacteria by Pure culture techniques. - Identification of Bacteria – Staining (Simple & Gram), Phenol red & Lipid hydrolysis Tests and Motility test.

Self-Study- Scope of Microbiology

UNIT –II BACTERIA (15 HRS.)

Outline classification of Bacteria according to Bergey's Manual -Morphology

and Physiology of Bacteria – Nutrition and growth –Bacterial respiration- Bacterial reproduction- Conjugation - Recombination- Economic importance.

Self-Study- Economic importance.

UNIT –III VIRUSES (15 HRS.)

General properties of Viruses –Structure of viruses- TMV, Adenovirus, Bacteriophages – Shape of viruses (Polyhedral, helical and complex)- Classification and Nomenclature of Viruses - DNA & RNA viruses – Viral Multiplication - Cultivation of Viruses - Types of cultures and assay - Viriods, Virion and Prion (Short notes only)

UNIT –IV MICROBES IN THE ENVIRONMENT (15 HRS.)

Bacteriology of Water- Microbes in Pond, lake, Sea and domestic water- methods of purification of water: Water potability analysis, determination of sanitary quality- Microbes in air and Measurement of air contamination - Biogeochemical cycles -Nitrogen Cycle, Phosphorus Cycle, Nitrogen fixation - Microbes for alternate source of energy - Hydrogen producing bacteria - *Halobacterium halobium.*

Self-Study- Biogeochemical cycles -Nitrogen Cycle

UNIT –V INDUSTRIAL MICROBIOLOGY (15 HRS.)

Fermentation technology – Fermentor – Types of fermentor – Production of microbial products through fermentor – Production of Antibiotics (Penicillin, Streptomycin & Tetracyclines), Organic acids (Citric acid & Acetic acid), Solvents (Ethyl alcohol & Glycerol), Yeast (Brewer's and Baker's), Single cell proteins (Bacterial proteins).

TEXT BOOK:

Anandhanarayanan. R and Panicker C.K., (2016). Text book of Microbiology, 8th Edition, Universities Press (India) Private Limited.

REFERENCES:

1. Pelczar, M.J., Chan, E.C.S and Krieig N.R.,(2008). Microbiology, 5th Edition, Tata McGraw Hill Edition. United States.

2. Tortora G.J, Funke B.R and Case C.L., (2009).Microbiology: An Introduction,11th Edition, United States.
3. Prescott L.M. Harley J.P and Klein D.A., (2010) Microbiology, 8th Edition. New Delhi.
4. Patel A.H. (2008).Industrial microbiology, Macmillan India LTD, Chennai.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1 INTRODUCTION TO MICROBIOLOGY				
1.1	The historical development and **scope of Microbiology**	2	Chalk & Talk	Black Board
1.2	Sterilization and disinfections - physical and chemical methods	2	Chalk & Talk	LCD
1.3	Culture media – Types	1	Lecture	PPT & White board
1.4	Culture techniques – Batch, Continuous, Synchronous and Fed-batch	2	Lecture	Smart Board
1.5	Methods of culturing bacteria	2	Lecture	Black Board
1.6	Isolation of bacteria by Pure culture techniques	1	Discussion	Black Board
1.7	Identification of Bacteria	2	Specimen	Microscope
1.8	Staining (Simple & Gram), Phenol red & Lipid hydrolysis Tests and Motility test.	3	Discussion	Black Board

	UNIT -2 BACTERIA			
2.1	Outline classification of Bacteria according to Bergey's Manual	2	Lecture	Black Board
2.2	Morphology and Physiology of Bacteria	4	Chalk & Talk	Black Board
2.3	Nutrition and growth	2	Chalk & Talk	Black Board
2.4	Bacterial respiration	3	Lecture	Black Board
2.5	Bacterial reproduction- Conjugation –Recombination	3	Chalk & Talk	Black Board
2.6	**Economic importance**	1	Lecture	Black Board
UNIT -3 VIRUSES				
3.1	General properties of Viruses	1	Chalk & Talk	Black Board
3.2	Structure of viruses- TMV, Adenovirus, Bacteriophages	3	Chalk & Talk	LCD
3.3	Shape of viruses (Polyhedral, helical and complex)	1	Lecture	PPT & White board
3.4	Classification and Nomenclature of Viruses	3	Lecture	Smart Board
3.5	DNA & RNA viruses	2	Lecture	Black Board
3.6	Viral Multiplication	3	Lecture	Black Board
3.7	Cultivation of Viruses	3	Discussion	Black Board
3.8	Types of cultures and assay	2	Lecture	Black Board

3.9	Viriods, Virion and Prion (Short notes only)	2	Discussio n	Black Board
UNIT -4 MICROBES IN THE ENVIRONMENT				
4.1	Bacteriology of Water	1	Lecture	Black Board
4.2	Microbes in Pond, lake, Sea and domestic water	3	Chalk & Talk	Black Board
4.3	Methods of purification of water: Water potability analysis, determination of sanitary quality	3	Chalk & Talk	Black Board
4.4	Microbes in air and Measurement of air contamination	2	Lecture	Black Board
4.5	**Biogeochemical cycles - Nitrogen Cycle**, Phosphorus Cycle	2	Chalk & Talk	Black Board
4.5	Nitrogen fixation	2	Lecture	Black Board
4.6	Microbes for alternate source of energy - Hydrogen producing bacteria - *Halobacterium halobium.*	2	Chalk & Talk	Black Board
UNIT -5 INDUSTRIAL MICROBIOLOGY				
5.1	Fermentation technology	1	Lecture	Black Board
5.2	Fermentor – Types of fermentor	2	Chalk & Talk	Black Board
5.3	Production of microbial products through fermentor	2	Chalk & Talk	Black Board
5.4	Production of Antibiotics (Penicillin, Streptomycin &	3	Lecture	Black

	Tetracyclines)			Board
5.5	Organic acids (Citric acid & Acetic acid)	2	Chalk & Talk	Black Board
5.5	Solvents (Ethyl alcohol & Glycerol), Yeast (Brewer's and Baker's)	3	Lecture	Black Board
5.6	Single cell proteins (Bacterial proteins)	2	Chalk & Talk	Black Board

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA	
Scholastic	**35**

Non Scholastic	**5**
	40

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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 out the importance and scope of Microbiology.	K1	PSO1
CO 2	Explain the types of Culture media.	K2	PSO4
CO 3	Outline the methods of culturing bacteria.	K2	PSO3
CO 4	Describe the ultra structure of bacteria.	K2	PSO4
CO 5	Discuss the gene transfer methods of bacteria.	K2	PSO3
CO 6	Compare the difference between DNA and RNA viruses.	K3	PSO4
CO 7	Summarize the microbial production in various industrial products.	K2	PSO12

COURSE DESIGNER:

Dr. X. Devanya Rosaline

II B.Sc.

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	**19Z4CC11**	**Evolution**	**Lecture**	**4**	**3**

COURSE DESCRIPTION

"Nothing in Biology makes sense except in the light of Evolution" – Dobzhansky.

The Course will provide a comprehensive knowledge on the history of evolutionary theories, evidences for evolution, origin of life, natural selection, speciation and human evolution

COURSE OBJECTIVES

- Gain Knowledge on the principles of Evolution.
- Understand the evolution and diversification of fauna of the biosphere since the origin of life.
- Understand the sources of genetic variation and their role in the process of Evolution.
- Inter-relate the role of Isolation, Genetic divergence and Natural Selection in speciation as well as Evolution.

UNITS

UNIT –I EVIDENCES OF EVOLUTION (12 HRS.)

Origin of life-Chemical origin of life-Oparin concept, Urey and Miller experiment - Comparative anatomical, Physiological evidences- Parallel evolution, Homologous structures, Vestigial organs, Convergent evolution-Analogous structures, Atavism, Connecting Links and adaptive radiation and Physiological/ Biochemical evidences.

Self Study - Vestigial organs

UNIT –II THEORIES OF EVOLUTION (12 HRS.)

Lamarckism- principles of Lamarckism-examples and Criticism of Lamarckism, Darwinism-Natural selection theory and supplementary theories- Sexual selection theory, Artificial selection theory and theory of Pangenesis, Neo Darwinism- experimental evidences-explanation to the objections, Mutation theory of De Vries- salient features, progressive species, Retrogressive species, Degressive species and Inconstant species.

Self Study - Artificial selection theory

UNIT –III MODERN SYNTHETIC THEORY (12 HRS.)

Modern synthetic theory-concepts of Modern synthetic theory-Genetic variation– gene pool-gene frequency-Hardy-Weinberg law-factors causing genetic variation-gene mutation-Chromosomal aberration –Hybridization – Recombination-Genetic Drift- operation of Modern synthesis-isolation and natural selection.

Self Study - Natural selection

UNIT –IV NATURAL SELECTION (12 HRS.)

Natural selection in action-Types of selection-Directional selection- salient features and examples- industrial Melanism, Stabilizing selection-salient features and examples, Disruptive selection- salient features and examples. Mimicry- definition, Batesian Mimicry- salient features and examples, Mullerian Mimicry- salient features and example.

Self Study - Industrial Melanism

UNIT –V SPECIATION& HUMAN EVOLUTION (12 HRS.)

Speciation – Types of speciation-mechanism of speciation- Patterns of speciation- Allopatric, Sympatric, Quantum and Parapatric speciation, Brief account on Geological Time scale, Human evolution- Physical/organic evolution- stages of human evolution - fossils of human evolution, Cultural evolution of man- milestones of cultural evolution.

Self Study - Milestones of cultural evolution

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

REFERENCES:

TEXT BOOKS:

Arumugam, N.(2019).*Organic Evolution.*7th edition,Saras Publication, Kanyakumari.

REFERENCE BOOKS:

1. Kocchar, P.L. (2003).*Genetics and Evolution.* 18th edition, Premchand Jain Publishers, New Delhi.

2. Sanjib Chattopadhyay. (2008).*Evolution.* Adaptation and Ethology, second edition, Books & Allied Pvt. Ltd., Kolkata.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
UNIT -1	**EVIDENCES OF EVOLUTION**			
1.1	History of Evolutionary theories	1	Chalk & Talk	Black Board
1.2	Theories of origin of life	1	Chalk & Talk	Black Board
1.3	Biochemical origin of life-Oparin concept	2	Lecture	PPT & White board
1.4	Parallel evolution,	1	Chalk & Talk	Black Board
1.5	Homologous structures,	1	Chalk & Talk	Black Board
1.6	Vestigial organs	1	Discussion	Google classroom
1.7	Convergent evolution & Analogous structures	1	Lecture	PPT

1.8	Atavism & Adaptive radiation	1	Lecture	PPT
1.9	Connecting Links	1	Lecture	LCD
1.10	Biochemical evidences	2	Lecture	PPT & White board
UNIT -2	**THEORIES OF EVOLUTION**			
2.1	Lamarckism- principles of Lamarckism	1	Chalk & Talk	Green Board
2.2	Lamarckism-examples	2	Chalk & Talk	Black Board
2.3	Criticism of Lamarckism	1	Chalk & Talk	Black Board
2.4	Darwinism-Natural selection theory	1	Chalk & Talk	Black Board
2.5	Supplementary theories- Sexual selection theory	1	Chalk & Talk	Black Board
2.6	Artificial selection theory and theory of Pangenesis	1	Chalk & Talk	Black Board
2.7	Neo Darwinism- experimental evidences	1	Lecture	PPT
2.8	Neo Darwinism-explanation to the objections	1	Chalk & Talk	Black Board
2.9	Mutation theory of De Vries-salient features	1	Lecture	PPT & White board
2.10	Progressive species, Retrogressive species, Degressive species and Inconstant species.	2	Lecture	LCD
UNIT -3MODERN SYNTHETIC THEORY				
3.1	Modern synthetic theory	1	Lecture	PPT

3.2	Concepts of Modern synthetic theory- Isolation	1	Lecture	PPT & White board
3.3	Genetic variation– gene pool-gene frequency-Hardy-Weinberg law	2	Lecture	LCD
3.4	Factors causing genetic variation	2	Lecture	LCD
3.5	Gene mutation	1	Lecture	LCD
3.6	Chromosomal aberration	1	Lecture	PPT & White board
3.7	Hybridization	1	Lecture	PPT & White board
3.8	Recombination	1	Lecture	PPT & White board
3.9	Genetic Drift & Founders Principle	1	Lecture	LCD
3.10	Operation of Modern synthesis-Natural selection.	1	Discussion	Google classroom
UNIT -4NATURAL SELECTION				
4.1	Natural selection in action	1	Chalk & Talk	Black Board
4.2	Directional selection- salient features and examples	2	Lecture	LCD
4.3	Industrial Melanism	1	Discussion	Google classroom
4.4	Stabilizing selection-salient features and examples	2	Lecture	LCD
4.5	Disruptive selection- salient features and examples	1	Lecture	LCD

4.6	Mimicry- definition, Introduction	1	Chalk & Talk	Black Board
4.7	Batesian Mimicry- salient features and examples	3	Lecture	LCD
4.8	Mullerian Mimicry- salient features and example	1	Lecture	LCD
UNIT 5 SPECIATION & HUMAN EVOLUTION				
5.1	Speciation – Types of speciation	1	Chalk & Talk	Black Board
5.2	Mechanism of speciation	1	Chalk & Talk	Black Board
5.3	Patterns of speciation-	1	Chalk & Talk	Black Board
5.4	Geological Time scale	2	Lecture	LCD
5.5	Human evolution	1	Chalk & Talk	Black Board
5.6	Physical/organic evolution	1	Lecture	PPT & White board
5.7	Stages of human evolution	1	Lecture	PPT & White board
5.8	Fossils of human evolution,	2	Lecture	PPT & White board
5.9	Phases of cultural evolution	1	Lecture	LCD
5.10	Milestones of cultural evolution	1	Lecture	LCD

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic**	**CIA Total**	**% of Assess**

						Marks C5		ment
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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	Recall the basic concepts of origin of life on earth.	K1	PSO1
CO 2	Relate the evidences of evolution by observing the morphology of organisms.	K3	PSO2 PSO4
CO 3	Summarize the theories of evolution	K2	PSO1 PSO4

CO 4	Interpret the reason for the occurrence of variation	K2	PSO2
CO 5	Discuss the role of Natural selection in the origin of a new species.	K2	PSO6
CO 6	Bring out the evolutionary significance of mimicry with suitable examples.	K1	PSO6
CO 7	Explain the role of isolation in the formation of a new species.	K2	PSO1
C0 8	Describe the stages of human evolution with reference to human fossils.	K2	PSO1

COURSE DESIGNER:

Dr. A. Tamil Selvi

II B.Sc.

SEMESTER – IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	**19Z4CC12**	**Lab in 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. Working Principle and Applications of Autoclave, Laminar Air Flow, Incubator
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

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	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 *Archaeopteryx*	3	Demonstration	Spotters
2.2	Mimicry- Leaf insect and	3	Demonstratio	Spotters

	Stick Insect		n	
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		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

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average 5 Mks.	**Better of W1, W2 5 Mks**	**M1+M2 5+5=10 Mks.**	**MID-SEM TEST 15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %

Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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 working Principle and Applications of instruments	K1	PSO1
CO 2	Demonstration on staining techniques	K3	PSO2
CO 3	Plan positive and negative aspects of microbes and learning to handle them safely	K3	PSO7
CO 4	Demonstration on Serial dilution	K3	PSO2
CO 5	Organise of phylogenetic trees with suitable specimen to develop the analytical skills	K3	PSO10
CO 6	Identify the different types analogous and homologous organs	K1	PSO1 & PSO 4
CO 7	Interpret the homology and analogy from suitable specimens/models/charts	K3	PSO7

COURSE DESIGNER:

Dr. Sr. Biji Cyriac

II B.Sc.

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z4SB2	MUSHROOM CULTIVATION	Lecture	2	2

COURSE DESCRIPTION

Develop basic knowledge in mushroom cultivation and spawn production

COURSE OBJECTIVES

To understand the value of edible mushrooms, know the cultivation process and thereby increase the employability

UNIT –I INTRODUCTION (6 HRS.)

Morphology of Mushrooms-Identification of mushrooms - Edible and poisonous mushrooms Nutritional and medicinal value of edible mushrooms- History of Mushroom cultivation – Present status of mushroom cultivation in India

Self-study- History of Mushroom cultivation – Present status of mushroom cultivation in India

UNIT –II COMPOSTING (6 HRS.)

Methods of Composting- Spawn production - Spawning- casing- Cropping and harvesting; Mushrooms farm design Construction and insulation – Growing rooms – Ventilation systems- Seasonal growing – casing pasteurization chamber

UNIT –III CULTIVATION (6 HRS.)

Cultivation techniques of edible mushrooms - *Pleurotus citrinopileatus* (Oyster mushroom) and *Agaricus bisporus* (Button mushroom)-Processing ,

grading and preservation of Mushrooms

UNIT –IV DISEASES AND PESTS (6 HRS.)

Management of fungal, bacterial and viral diseases in mushroom; Competitors, pests and nematodes in mushrooms- Precautions to avoid insects, pests and diseases

UNIT –V ECONOMICS OF MUSHROOM CULTIVATION (6 HRS.)

Economics of mushroom cultivation – Fixed costs, variable costs- Economics of canned products - Mushroom Export- Extension training and entrepreneurship - Mushroom Recipies

TEXT BOOKS

1.Jana B.L., (2014). *Mushroom culture*. Agrotech publishing company. Udaipur

2. Nita B., (2009). *Hand book on Mushrooms*. Oxford & IBH Publishers, New Delhi.

REFERENCES

1. Marimuthu T.,Krishnamoorthy A.S., Sivaprakasam K., & Jayarajan R., (1991).*OysterMushrooms.* Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
2. Swaminathan M., (1990). *Food and Nutrition.* Bappco, The Bangalore Printing and Publishing Co. Ltd., Bangalore.
3. Tewari, Pankaj K.S.C.,(1988). *Mushroom cultivation.* Mittal Publications, Delhi.
4. Muthusamy A.D., & Yesuraja I., (1999). *Mushroom Culture.* TNAU Publishers, New Delhi.
5. Tripathi D.P., (2005). *Mushroom Cultivation.* Oxford & IBH Publishers New Delhi

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**INTRODUCTION**			
1.1	Identification of mushrooms	1	Chalk & Talk	Black Board
1.2	Edible and poisonous mushrooms	1	Chalk & Talk	LCD
1.3	Morphology of Mushrooms	1	Lecture	PPT & White board
1.4	Nutritional and medicinal value of edible mushrooms	1	Lecture	Smart Board
1.5	History of Mushroom cultivation	1	Discussion	Google classroom
1.6	Present status of mushroom cultivation in India	1	Discussion	Google classroom
UNIT -2	**COMPOSTING**			
2.1	Methods of Composting	1	Lecture	Green Board Charts
2.2	Spawn production - Spawning- casing- Cropping and harvesting	2	Chalk & Talk	Green Board
2.3	Mushrooms farm design Construction and insulation	1	Lecture	PPT & White board
2.4	Growing rooms – Ventilation systems- Seasonal growing – casing pasteurization chamber	2	Lecture	Smart Board
UNIT -3CULTIVATION				

3.1	Cultivation techniques of edible mushrooms - *Pleurotus citrinopileatus* (Oyster mushroom)	2	Lecture	Smart Board
3.2	*Agaricus bisporus* (Button mushroom)-	2	Lecture	Black Board
3.3	Processing, grading and preservation of Mushrooms	2	Chalk &Talk	Black Board
UNIT -4DISEASES AND PESTS				
4.1	Management of fungal, bacterial	1	Chalk & Talk	Green Board
4.2	viral diseases in mushroom	1	Chalk &Talk	Black Board
4.3	Competitors, pests and nematodes in mushrooms	2	Chalk & Talk	Green Board
4.4	Precautions to avoid insects, pests and diseases	2	Lecture	PPT & White board
UNIT -5ECONOMICS OF MUSHROOM CULTIVATION				
5.1	Economics of mushroom cultivation – Fixed costs, variable costs	2	Lecture	Green Board Charts
5.2	Economics of canned products	1	Chalk & Talk	Green Board
5.3	Mushroom Export	1	Lecture	PPT & White board
5.4	Extension training and entrepreneurship	1	Discussio n	Google classroom
5.5	Mushroom Recipies	1	Discussio n	Google classroom

Levels	C1	C2	C3	C4	Total Scholastic Marks	Non Scholastic Marks C5	CIA Total	% of Assessment
	Session -wise Average 5 Mks.	Better of W1, W2 5 Mks	M1+M2 5+5=10 Mks.	MID-SEM TEST 15 Mks	35 Mks.	5 Mks.	40Mks.	
K1	5	-	-	2 ½	7.5	-	7.5	18.75 %
K2	-	5	4	2 ½	11.5	-	11.5	28.75 %
K3	-	-	3	5	8	-	8	20 %
K4	-	-	3	5	8	-	8	20 %
Non Scholastic	-	-	-	-		5	5	12.5 %
Total	5	5	10	15	35	5	40	100 %

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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
CO1	Recognize the scope of mushroom cultivation	K1	PSO1, PSO2& PSO9

CO2	Compare and contrast the edible and poisonous mushrooms	K2	PSO1,PSO2&PSO 9
CO3	Explain the nutritional and medicinal values of Mushrooms	K2	PSO1&PSO9
CO4	Describe the spawn production methodology	K3	PSO1&PSO9
CO5	Develop a model for mushroom farm	K3	PSO1&PSO9
CO6	Apply the mushroom cultivation process	K3	PSO1PSO4 & PSO9
CO7	Identify the diseases and competitors in mushroom cultivation	K1	PSO1,PSO2& PSO9
CO8	List the value-added products from mushrooms	K1	PSO1,PSO6& PSO9

COURSE DESIGNER:
Dr.V. Bharathy

II B.Sc.

SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	**19Z4ACQ3**	**DEVELOPMENTAL BOTANY & PLANT BREEDING**	**Allied Theory**	**3**	**3**

COURSE DESCRIPTION

To study basic functioning of plant life.

COURSE OBJECTIVES

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

UNIT –I PLANT ANATOMY (9HRS.)

Types of Meristems- Simple permanent tissue, Complex permanent tissue, Primary structure of stem, leaf and root in dicot and monocot plants, secondary growth-dicot stem.

Self-study - Types of Meristems

UNIT –II PLANT PHYSIOLOGY (9 HRS.)

Transpiration-Types, Mechanism of Transpiration,Absorption of water Photosynthesis-Light reaction and Dark reaction, Respiration - Glycolysis, Kreb's cycle - Plant Growth hormones – Physiological role of Auxins, Gibberellin and Cytokinin- Photomorphogenesis (Brief account only)

Self-study- Absorption of water and Photomorphogenesis

UNIT –III EMBRYOLOGY (9 HRS.)

Structure and development of anther-Male gametophyte – Structure and Development of ovule- Types of ovule- Female gametophyte (*Polygonum*

type) - Dicot embryo- crucifer type.

UNIT –IV PLANT BREEDING (9 HRS.)

Crop improvement -Introduction & scope - methods- conventional- mutation and ploidy breeding; Non-conventional - Somaclonal variation, Somatic embryogenesis- Hybridization technique - Interspecific and Intraspecific hybridization.

Self-study- Crop improvement - Introduction & scope

UNIT –V HORTICULTURE (9 HRS.)

Horticultural Tools- Vegetative propagation of plants – cuttage and layerage –Types and advantages - Indoor gardening – Hanging pot and Terrace gardening, Layout of a Kitchen Garden

Self-study- Lay out of a Kitchen Garden

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., (2007). *Plant Anatomy*, S. Chand & Co. De, New Delhi

2.Bhojwani S.S., & Bhatnagar. S.P., (1994). *Embryology of Angiosperms*. Vikas Publishing House (P) Ltd., New Delhi

3.Rasool S.K., & Sekar T., (2002). *Allied Botany*. Popular Book Hour, Chennai -15

4.Kumar N.,(2016). *Introduction To Horticulture*. Oxford and IBH publishing,New Delhi.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
UNIT -1	**PLANT ANATOMY**			
1.1	Types of Meristems	1	Discussion	Google classroom
1.2	Simple permanent tissue	1	Chalk & Talk	LCD
1.3	Complex permanent tissue	2	Chalk & Talk	LCD
1.4	Primary structure of stem, leaf and root in dicot plants	2	Chalk & Talk	Chart
1.5	Primary structure of stem, leaf and root in monocot plants	2	Chalk & Talk	Chart
1.6	secondary growth-dicot stem.	1	Lecture	Black Board
UNIT -2	**PLANT PHYSIOLOGY**			
2.1	Transpiration-Types, Mechanism of Transpiration,	1	Lecture	Green Board Charts
2.2	Absorption of water	1	Discussion	Google classroom
2.3	Photosynthesis Light reaction	1	Chalk & Talk	Green Board
2.4	Dark reaction	1	Chalk & Talk	Chart
2.5	Respiration - Glycolysis	1	Chalk & Talk	Chart
2.6	Kreb's cycle	1	Lecture	Black

				Board
2.6	Plant Growth hormones – Physiological role of Auxins,	1	Lecture	Google classroom
2.7	Gibberellin and Cytokinin	1	Lecture	Google classroom
2.8	Photomorphogenesis (Brief account only)	1	Discussion	Google classroom
UNIT -3 EMBRYOLOGY				
3.1	Structure and development of anther, Male gametophyte	2	Chalk & Talk	Green Board
3.2	Structure and Development of ovule	2	Chalk & Talk	Chart
3.3	Types of ovule	2	Chalk & Talk	Chart
3.4	Female gametophyte (*Polygonum* type) -	2	Lecture	Black Board
3.5	Dicot embryo crucifer type.	1	Chalk & Talk	Green Board
UNIT -4 PLANT BREEDING				
4.1	Crop improvementIntroduction & scope methods- conventional-mutation and ploidy breeding	3	Chalk & Talk	Chart
4.2	Non-conventional - Somaclonal variation	1	Lecture	Google classroom
4.3	Somatic embryogenesis	1	Discusssion	Google classroom
4.4	Hybridization technique - Interspecific	2	Chalk & Talk	Chart

4.5	Intraspecific hybridization.	2	Lecture	Google classroom
UNIT -5 HORTICULTURE				
5.1	Horticultural Tools	1	Chalk & Talk	Chart
5.2	Vegetative propagation of plants – cuttage	2	Lecture	Google classroom
5.3	layerage –Types and advantages	2	Lecture	Black Board
5.4	Hanging pot and Terrace gardening	2	Chalk & Talk	Green Board
5.5	Indoor gardening –Layout of a Kitchen Garden	2	Discussion	Google classroom

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %

K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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
CO1	Illustrate the structure of various tissues and their functions	K1	PSO1,PSO3& PSO2
CO2	Compare and contrast the anatomical differences between the anatomical structures of Dicot and Monocot plants	K2	PSO2,PSO3
CO3	Recognize the mechanism of absorption of water and translocation of food in plants	K3	PSO2,PSO3&PSO 5
CO4	Summarize the mechanism of photosynthesis and respiration in plants	K2	PSO2&PSO3
CO5	Relate phytohormones and their role in plant growth	K1	PSO2&PSO3
CO6	Explain the development of male and female reproductive	K2	PSO2&PSO3

	organs in plants and infer flower and fruit setting in plants		
CO7	Explain the various techniques in the crop improvement programmes	K2	PSO2&PSO3
CO8	Make use of techniques of vegetataive propagation and gardening and construct a home garden	K3	PSO2,PSO6&PSO 9

COURSE DESIGNER:
Dr. V. Bharathy

II B.Sc.

SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z4ACQ4	LAB-DEVELOPMENTAL BOTANY & PLANT BREEDING	Allied Practical	2	2

COURSE DESCRIPTION

To study basic functioning of plant life.

COURSE OBJECTIVES

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

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

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).

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
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	2	Demonstratio	Experimental

	Experiment of Willmont's Bubbler using different colour filters		n	setup
5	Demonstration of Anaerobic respiration	2	Demonstratio n	Experimental setup
7	Identification of different stages of embryo in *Tridax.*	2	Dissection	Specimen & Microscope
8	Demonstration Horticultural techniques prescribed in the syllabus	2	Demonstratio n	Horticultural tools
9	Spotters	-	Discussion	specimen
10.	Record Note	-	Discussion	specimen

Levels	**C1**	**C2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session -wise Average **5 Mks.**	**Better of W1, W2** **5 Mks**	**M1+M2** **5+5=10 Mks.**	**MID-SEM TEST** **15 Mks**	**35 Mks.**	**5 Mks.**	**40Mks.**	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	-	**7.5**	18.75 %
K2	**-**	**5**	**4**	**2 ½**	**11.5**	-	**11.5**	28.75 %
K3	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
K4	**-**	**-**	**3**	**5**	**8**	-	**8**	20 %
Non Scholastic	**-**	**-**	**-**	-		**5**	**5**	12.5 %

Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

CIA

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

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2-**Understand, **K3-**Apply, **K4-**Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				**NON - SCHOLASTIC**	**MARKS**		
C1	**C2**	**C3**	**C4**	**C5**	**CIA**	**ESE**	**Total**
5	**10**	**15**	**5**	**5**	**40**	**60**	**100**

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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
CO1	Illustrate the anatomy of Monocot and dicot stem , root and leaf	K2	PSO1,PSO2&PSO 7
CO2	Interpret experimental set ups in plant physiology	K2	PSO1, PSO2,PSO3&PSO 7
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

COURSE DESIGNER:
V. Bharathy

II B.Sc.

SEMESTER –IV

For II B.Sc Chemistry those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19C4ACZ3	Cell & Molecular Biology	Allied Theory	3	3

COURSE DESCRIPTION

- This course is designed for the chemistry student which discusses the branch of Zoology that deals with Cell and Molecular Biology.

COURSE OBJECTIVES

- Attain a precise knowledge on the prokaryotic and eukaryotic cell structure and function.
- Provides foundation studies for molecular biology.

UNITS

UNIT –I OUTLINE AND ORGANIZATION OF A CELL (9 HRS.)

General structure and function of animal cell & cell organelles. Differences between Prokaryotes and Eukaryotes.

Self Study - Differences between Prokaryotes and Eukaryotes.

UNIT –II STRUCTURE AND FUNCTIONS OF CELL ORGANELLES (9 HRS.)

Plasma Membrane: Models, Chemical composition and functions.

Mitochondria: Structure and Functions. Endoplasmic Reticulum: Structure and functions.

UNIT –III NUCLEAR COMPONENTS AND CELL CYCLE (9 HRS.)

Nucleus: Structure- nuclear membrane, pore complex, nucleoplasm, chromatin reticulum, nucleolus, chemical composition, functions. Chromosomes: Shapes based on position of cetromere, functions, Special types- Polytene and lampbrush chromosomes. Brief account on Mitosis and Meiosis.

UNIT –IV MOLECULAR BIOLOGY (9 HRS.)

DNA as Genetic material – Griffith's experiment, Hershey and Chase experiment-Structure and types of DNA and RNA-Replication of DNA – Meselson & Stahl experiment-Types of DNA Mutation

UNIT –V CENTRAL DOGMA OF MOLECULAR BIOLOGY (9 HRS.)

Transcription in prokaryotes- Properties of Genetic Code. Translation: Protein Synthesis. Gene Regulation - Lac Operon.

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

REFERENCES:

1. Arumugam, N., (2014). Cell Biology, Tenth Edition, Saras Publication, Nagercoil.

2. Arumugam N. (2014). Molecular Biology. Saras Publications, Nagercoil.

3. Watson J.D., Baker T.A., Stephen B.P., Gann A., Levine M and Losick R., Molecular Biology of the Gene, 5th ed., Pearson Education (2004).

4. Lodish D.J and Baltimore D. Molecular Cell Biology, 5th ed., Sci. American Books, W.H. Freeman and Company, New York (2004).

5. Wolfe S.L. An Introduction to Cell and Molecular Biology, Wadsworth Publishing Company, New York (1995).

6. Geoffery M. Cooper and Robert Hausman, (2009). The Cell: A Molecular Approach,Fifth edition, ASM Press and Sineur Associates, Inc.

7. Rastogi S.C.,(2003).Cell and Molecular Biology - Second Edition, New Age International (P) Limited Publishers, Daryaganj, New Delhi.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	**Topic**	**No. of Lectures**	**Teaching Pedagogy**	**Teaching Aids**
UNIT -1 OUTLINE AND ORGANIZATION OF A CELL				
1.1	General structure and function of animal cell & cell organelles.	1	Chalk & Talk	Black Board
1.2	Subtopics: Cell membrane- structure & Functions	1	Chalk & Talk	LCD

1.3	Mitochondria- structure & Functions	1	Lecture	PPT & White board
1.4	Golgi Bodies, Lysosomes - structure & Functions	1	Lecture	Smart Board
1.5	Endoplasmic Reticulum- structure & Functions	1	Lecture	Black Board
1.6	Nucleus- structure & Functions	1	Discussion	Google classroom
1.7	Cell Inclusions	2	Lecture	Black Board
1.8	**Differences between Prokaryotes and Eukaryotes.**	1	Discussion	Black Board
UNIT -2 STRUCTURE AND FUNCTIONS OF CELL ORGANELLES				
2.1	Plasma Membrane: Models,	1	Lecture	Green Board Charts

2.2	Chemical composition and functions	2	Chalk & Talk	Green Board
2.3	Mitochondria: Structure	1	Chalk & Talk	Black Board
2.4	Mitochondria: Functions	2	Chalk & Talk	LCD
2.5	Endoplasmic Reticulum: Structure	1	Lecture	PPT & White board
2.6	**Subtopics**: types - ribosome	1	Lecture	Smart Board
2.7	**Subtopics**: functions	1	Lecture	PPT
UNIT -3 NUCLEAR COMPONENTS AND CELL CYCLE				
3.1	Nucleus: Types Structure	1	Lecture	Black Board
3.2	chemical composition, functions.	1	Discussion	Black Board

3.3	Chromosomes: Shapes based on position of cetromere, functions,	1	Chalk & Talk	Black Board
3.4	Nucleolus – structure and Functions	1	Chalk & Talk	LCD
3.5	Polytene chromosomes	1	Lecture	PPT & White board
3.6	Lampbrush chromosomes	1	Lecture	Smart Board
3.7	Mitosis	1	Lecture	LCD/PPT
3.8	Meiosis	2	Lecture	LCD
UNIT -4 MOLECULAR BIOLOGY				
4.1	DNA as Genetic material	1	Discussion	Black Board
4.2	Griffith's experiment	1	Chalk & Talk	Black Board

4.3	Hershey and Chase experiment-	1	Chalk & Talk	LCD
4.4	Structure and types of DNA and RNA-	2	Lecture	PPT & White board
4.5	Replication of DNA	2	Lecture	LCD
4.6	Meselson & Stahl experimen-	1	Lecture	Black Board
4.7	Types of DNA Mutation	1	Discussion	Google classroom
UNIT -5 CENTRAL DOGMA OF MOLECULAR BIOLOGY				
5.1	Central Dogma of Molecular Biology	1	Discussion	Black Board
5.2	Transcription in prokaryotes-	2	Lecture	PPT/LCD
5.3	Properties of Genetic Code.	1	Chalk & Talk	Black Board

5.4	Translation: Protein Synthesis.	3	Lecture	PPT
5.5	Gene Regulation - Lac Operon	2	Lecture	LCD

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Outline the general structure and function of a prokaryotic and eukaryotic cell.	K2	PSO1
CO 2	Explain the various proposed models regarding the structure of Plasma membrane	K2	PSO1
CO 3	Explains the structure and function of Nucleus, Mitochondria and Endoplasmic reticulum	K2	PSO1

CO 4	Summarize the structure and type of chromosome	K2	PSO1
CO 5	Justify that DNA is a genetic material with the knowledge of Griffith's, Hershey and Chase experiments.	K5	PSO1& PSO4
CO6	Recall the structure and types of DNA and RNA	K1	PSO1
CO7	Summarize the mechanism of translation, transcription and Lac operon concept in Prokaryotes	K2	PSO1 & PSO8

Levels	**C1**	**C 2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session - wise Average	**Better of W 1, W 2**	**M1 +M 2**	**MID-SEM TEST**				

	5 Mks.	5 Mks	5+5 =10 Mks.	15 Mks	35 Mks.	5 Mks.	40 Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	**-**	**7.5**	**18.75 %**
K2	**-**	**5**	**4**	**2 ½**	**11.5**	**-**	**11.5**	**28.75 %**
K3	**-**	**-**	**3**	**5**	**8**	**-**	**8**	**20 %**
K4	**-**	**-**	**3**	**5**	**8**	**-**	**8**	**20 %**
Non Scholastic	**-**	**-**	**-**	**-**		**5**	**5**	**12.5 %**
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

	40

- ✔ **All the course outcomes are to be assessed in the various CIA components.**
- ✔ **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

K1- Remember, **K2**-Understand, **K3**-Apply, **K4**-Analyse

- ✔ **The I UG course teachers are requested to start conducting S1, W1, M1,**

  in due intervals of time.

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

COURSE OUTCOMES

NO.	COURSE OUTCOMES	KNOWLEDGE LEVEL (ACCORDING TO REVISED BLOOM'S TAXONOMY)	PSOs ADDRESSED
CO 1	Outline the general structure and function of a prokaryotic and eukaryotic cell.	K2	PSO1
CO 2	Explain the various proposed models regarding the structure of Plasma membrane	K2	PSO1
CO 3	Explains the structure and function of Nucleus, Mitochondria and Endoplasmic reticulum	K2	PSO1
CO 4	Summarize the structure and type of chromosome	K2	PSO1
CO 5	Justify that DNA is a genetic material with the knowledge of Griffith's, Hershey and Chase experiments.	K5	PSO1&PSO4
CO6	Recall the structure and types of DNA and RNA	K1	PSO1

CO7	Summarize the mechanism of translation, transcription and Lac operon concept in Prokaryotes	K2	PSO1& PSO8

COURSE DESIGNER:
Dr.N.Nagaraniy

II B.Sc. Chemistry

SEMESTER –IV

For II B.Sc Chemistry those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19C4ACZ4	Lab – Cell & Molecular Biology	Allied Practical	2	2

COURSE DESCRIPTION

Students develop laboratory skills with identification of preserved specimen, manipulation of prepared slides, dissections and display under the microscope

COURSE OBJECTIVES

To study the life science application in molecular field

UNIT

CELL BIOLOGY

1. Laboratory rules and regulations
2. Microscopic observation of squamous epithelial cheek cells
3. Squash preparation of mitotic stages in Onion root tip.
4. Preparation and identification of Polytene Chromosomes in the Salivary gland of Chironomus larva

Spotters : Stages of Meiosis, Cellular organelles – Mitochondria,

Endoplasmic reticulum, Golgi complex, Nucleus, Ribosome

MOLECULAR BIOLOGY

1. Isolation of DNA from onion bulb (demo).

Spotters: DNA Model, DNA Replication

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, 1st ed., Himalaya Publishing House Pvt. Ltd., Mumbai.

4. Dutta A., (2009) Experimental Biology Lab manual, Narosa Publishing House, New Delhi.

COURSE CONTENTS & LECTURE SCHEDULE:

Module No.	Topic	No. of Lectures	Teaching Pedagogy	Teaching Aids
Cell Biology				
1.1	Laboratory rules and regulations	2	Discussion	PPT

1.2	Microscopic observation of squamous epithelial cheek cells	2	Hands on Training	Microscope
1.3	Squash preparation of mitotic stages in Onion root tip.	2	Hands on Training	Microscope
1.4	Preparation and identification of Polytene chromosomes in the Salivary gland of Chironomus larva	2	Hands on Training	Microscope
1.5	Spotters : Stages of Meiosis,	2	Discussion	LCD/PPT
1.6	Sub topics: Mitochondria, Endoplasmic reticulum, Golgi complex, Nucleus, Ribosome	2	Discussion	LCD/PPT

1.7	Sub topics: Golgi complex, Nucleus, Ribosome	2	Discussion	LCD/PPT
Molecular Biology				
2.1	Isolation of DNA from onion bulb (demo).	2	Hands on Training	Blood Sample
2.2	Spotters: DNA Model	2	Discussion	Model
2.3	DNA Replication	2	Discussion	Model

Levels	**C1**	**C 2**	**C3**	**C4**	**Total Scholastic Marks**	**Non Scholastic Marks C5**	**CIA Total**	**% of Assessment**
	Session - wise Average	**Better of W1, W2**	**M1 +M2**	**MID-SEM TEST**				

	5 Mks.	5 Mks	5+5 =10 Mks.	15 Mks	35 Mks.	5 Mks.	40 Mks.	
K1	**5**	**-**	**-**	**2 ½**	**7.5**	**-**	**7.5**	**18.75 %**
K2	**-**	**5**	**4**	**2 ½**	**11.5**	**-**	**11.5**	**28.75 %**
K3	**-**	**-**	**3**	**5**	**8**	**-**	**8**	**20 %**
K4	**-**	**-**	**3**	**5**	**8**	**-**	**8**	**20 %**
Non Scholastic	**-**	**-**	**-**	**-**		**5**	**5**	**12.5 %**
Total	**5**	**5**	**10**	**15**	**35**	**5**	**40**	**100 %**

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

- **All the course outcomes are to be assessed in the various CIA components.**
- **The levels of CIA Assessment based on Revised Bloom's Taxonomy for I UG are :**

  K1- Remember, K2-Understand, K3-Apply,K4-Analyse

- **The I UG course teachers are requested to start conducting S1, W1, M1, in due intervals of time.**

EVALUATION PATTERN

SCHOLASTIC				NON - SCHOLASTIC	MARKS		
C1	C2	C3	C4	C5	CIA	ESE	Total
5	10	15	5	5	40	60	100

C1 – Average of Two Session Wise Tests

C2 – Average of Two Monthly Tests

C3 - Mid Sem Test

C4 – Best of Two Weekly Tests

C5 – Non - Scholastic

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	Interpret the observation of Simple Mendelian Traits in the class	K5	PSO1, PSO2 & PSO10
CO 2	List the features of the given spotters: Stages of Meiosis, Cellular organelles – Mitochondria, Endoplasmic reticulum, Golgi complex, Nucleus.	K1	PSO1
CO 3	Dissect and mount the Polytene Chromosomes in the Salivary gland of *Chironomus* larva.	K4	PSO4 &PSO7
CO 4	Interpret the mitotic stages from the squash preparation in Onion root tip	K2	PSO1,PSO2 & PSO7
CO 5	Recall the structure of DNA	K1	PSO1
CO7	Recall the structure of human physiological models such as Ear, Eye and heart.	K1	PSO1

COURSE DESIGNER:
Dr.N.Nagarani

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18
III B.Sc., ZOOLOGY- SEMESTER V
BIOCHEMISTRY – Z5CC11

6 hours/Week **Marks: Internal – 25**
Credits: 5 **External – 75**
Total - 100

OBJECTIVE:

To familiarize the students with the structure and role of biomolecules and the physiochemical processes of the living beings.

UNIT I: CARBOHYDRATES [18 Hrs]

Classification, properties and physiological significance of Monosaccharide –structure and function of Glucose and Fructose- Disaccharides –structure and biological significance of Lactose and Sucrose-Polysaccharides –structure and biological significance of Starch, Glycogen and Cellulose.

UNIT II: LIPIDS [18 Hrs]

Properties, physiological significance of Simple lipids -Triacyl Glycerol –saturated and unsaturated fatty acids, essential and non-essential fatty acids, Glycerol – structure and biological significance of Waxes –Spermaceti-Complex lipids-Phospholipids –structure and biological significance-Glycolipids –structure and biological significance of Derived lipids – Cholesterol.

UNIT III: **PROTEINS [18 Hrs]**

Amino acid – basic structure, classification, properties - Classification and physiological significance of Simple proteins-Conjugated proteins - Derived proteins - Organization of Proteins- Primary, Secondary, Tertiary and Quaternary Structure.

UNIT IV: METABOLISM [18 Hrs]

Carbohydrate metabolism – Glycolysis, Kreb's cycle, Glycogenesis, Glycogenolysis - Lipid metabolism - β-oxidation and biosynthesis of Cholesterol- Protein metabolism- Transamination, Deamination, Decarboxylation, synthesis of urea.

UNIT V: ENZYMES [18Hrs]

Classification & properties of enzymes - Mechanism of enzymatic reaction – Michaelis - Menten equation - Factors affecting enzymatic reaction rate - Temperature, pH, substrate &

enzyme concentration - Enzyme inhibition - Competitive, Non-Competitive & Allosteric types - Biological significance of Fat soluble & water soluble vitamins.

TEXT BOOK

1. A.C.Deb, (1999). Concepts of Biochemistry. Books and Allied (P) Ltd.Calcutta.
2. Jain, (2007).Fundamentals of Biochemistry. Chand & Co, New Delhi.

REFERENCES:

1. Stryer Lubert, (1975). Biochemistry. Freeman & Company, San Francisco.
2. Devlin T M, (2002).Text Book of Biochemistry with clinical correlations. Wiley-Liss, New York.
3. Donald Voet, Judith G. Voet,(2004). Biochemistry. Wiley, New York.
4. David L.Nelson, Michael M.Cox, (2007). Lehninger. Principles of Biochemistry, Fourth edition.

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

III B.Sc., ZOOLOGY- SEMESTER V

MOLECULAR BIOLOGY – Z5CC12

5hrs/week **Marks:Internal-25**
Credits: 5 **External -75**
Total - 100

OBJECTIVE:

To understand the molecular processes of cells and the flow of genetic information and to appreciate the regulatory mechanisms of gene expression by the complex interactions of biomolecules.

UNIT I: INTRODUCTION (15 Hrs)

Milestones in molecular biology – structural organization of chromosomes – Prokaryotes and Eukaryotes – histones – nucleosomes – heterochromatin & euchromatin, introns, exons – gene families, pseudogenes – repetitive sequences – C value paradox - Transpooans.

UNIT II: DNA REPLICATION AND REPAIR (15 Hrs)

Watson & Crick DNA double helix – Properties of DNA – Semi-conservative mode of replication & Meselson - Stahl experiment - DNA replication- enzymes involved: DNA Polymerase, Helicase, Topoisomerases, SSBs – DNA damage and repair mechanisms - Direct, Excision, Recombinational and Mismatch repair mechanisms

UNIT III: **TRANSCRIPTION (15 Hrs)**

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.

UNIT IV: TRANSLATION (15 hrs)

Protein synthesis – properties of Genetic code - Mechanism of translation in Prokaryotes: Initiation, elongation, termination – Translation in eukaryotes – Gene regulation in prokaryotes- *lac* operon and *trp* operon.

UNIT V: **PROTEIN FOLDING & TARGETING (15 Hrs)**

Post translational modifications – protein folding – molecular chaperones – protein targeting signal peptide sequence – protein degradation – ubiquitin- proteosome degradation pathway.

TEXT BOOKS:

1. Arumugam N (2014). Molecular Biology. Saras Publications, Nagercoil.

2. Geoffery M. Cooper and Hausman Robert E., (2009) The Cell: A Molecular Approach, 5th ed., ASM Press, Washington, D.C., and Sinauer Associates, Inc., Sunderland, Massachusetts.

REFERENCES:

1. Brown T.A., (2002) Genomes, 2nd ed., Wiley – Liss publications, New York,.
2. Weaver R., (1999) Molecular Biology, WCB / Mc Graw-Hill, London,.
3. 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.
4. Lodish D.J and Baltimore D., (2004) Molecular Cell Biology, 5th ed., Sci. American Books, W.H. Freeman and Company, New York.
5. Wolfe S.L., (1995) An Introduction to Cell and Molecular Biology, Wadsworth Publishing Company, New York.
6. De Robertis, E.D.P and De Robertis E.M.F., (1988) Cell and Molecular Biology, 8th ed., International ed., Infomed, HonKong.
7. Malacinski G.M., (2008) Freifelder's Essentials of Molecular Biology, 4th ed., Narosa Publishing House, New Delhi.
8. Rastogi S.C., (2003) Cell and Molecular Biology – 2nd ed., New Age International Pvt Limited Publishers, Daryaganj, New Delhi.

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

III B.Sc., ZOOLOGY- V SEMESTER

BIOPHYSICS & INSTRUMENTATION – Z5CC13

4 Hrs/Week **Marks: Internal-25**

Credits : 4 **External -75**

Total - 100

OBJECTIVE:

To study the basic principles of Biophysics that is relevant and applied to the life principle and the usage of instruments in biological studies

UNIT-I: THERMODYNAMICS (12 Hrs)

Laws of thermodynamics-First, Second and Third Laws-Enthalpy, Entropy and Free energy, Isolated, Closed and Open system, Effects of ionizing radiation and UV light on cells- Quantum theory of radiation-Electromagnetic spectrum, Redox potential

UNIT-II: COLLOIDS (12 Hrs)

Colloids-Protoplasm as a colloid - Brownian movement, Tyndall effect- Properties ,Types and applications of colloids- Colligative properties of electrolytes- Gibb's Donnan equilibrium

UNIT-III: CELL MECHANICS (12 Hrs)

Principle of energetics of Active transport- Methods, Factor affecting and Biological applications of Osmosis, Diffusion, Viscosity and Surface Tension, Plasmolysis- Mechanism, solute and water potential, Turgour pressure and application, Energy rich compounds-ATP and their role

UNIT-IV: WORKING PRINCIPLE, COMPONENTS AND APPLICATIONS (12 Hrs)

Colorimeter: Beer's &Lambert's Laws with verification, Centrifuge: Principles, types and applications, pH meter: Mechanism of hydrogen ion concentration buffers- Henderson-Hasselbalch equation. Chromatography: Paper Chromatography: Ascending, Descending and Circular - Thin layer Chromatography.

UNIT-V: MICROTECHNIQUES AND RADIATION (12 Hrs)

Microtechniques - Fixation, Sectioning and Staining techniques, Radioisotopes-Definition, Units, Types of radioactivity and Biological effects of radiation, Measurement of radioacitivity - Scintillation Counter, Liquid Scintillation Counter and Geiger Muller counter Autoradiography-Principle, Specimen preparation and Methods.

TEXT BOOKS:

1. M.A. Subramanian, 2008. Biophysics- Principles and Techniques, M.J.P Publishers, Chennai.
2. S.Palanisamy & M.Shanmugavelu, 2006. Principles of Biophysics, Paramount

Publications.

3. S.Thiravia Raj, 1993. Biophysics, Saras Publication,Kanyakumari.

REFERENCES

1. J. Jeyaraman, 1980. Techniques in Biology, School of Biological Sciences, MKU.
2. S.C.Rastogi, 2003. Cell and Molecular Biology, New Age International (P) Ltd Publishers,
3. Daryaganj, New Delhi, II edition, Page 26-134.
4. David Freifelder, 1990. Molecular Biology, First Narosa Publishing House, Prakash Deep
5. New Delhi, Second Edition, Page: 167-301.

FATIMA COLLEGE (AUTONOMOUS), MADURAI – 18

III B.Sc., ZOOLOGY - SEMESTER - V

EMBRYOLOGY - Z5ME1

5hrs/week **Marks: Internal 25**

Credits: 5 **External 75**

Total: 100

OBJECTIVE :

To acquaint the students with development of cell from egg to the foetus stage.

UNIT I - INTRODUCTION TO GAMETOGENESIS & FERTILIZATION(15 Hrs)

Structure of sperms and eggs - influence of yolk - polarity - symmetry - Egg membranes. Spermatogenesis and Oogenesis in bird and mammal-Fertilization - Physical, Chemical, Cytological and Physiological factors-Activation - Theories of Activation.

UNIT II - EARLY EMBRYONIC DEVELOPMENT. (15 Hrs)

Cleavage: Salient features, Planes, Patterns and Physiology of Cleavage-Morhpogenetic movements and Fatemap-Early Embryonic Development - Cleavage, Gastrulation and Fatemap of Chick.

UNIT III – ORGANOGENESIS (15 Hrs)

Development of Eye and Heart in Chick - Development of Foetal membranes in Mammal-Placenta - Characteristics, Classification, Functions and Development. Developmental defects.

UNIT IV - HUMAN EMBRYOLOGY – I (15 Hrs)

Gastrulation, Implantation, development of germ layer, development of foetus (Brief account on Trimester stages) - Pregnancy and Child Birth- Vaccination during gestational period. Role of hormones in gestational period; Prolactin, Vasopressin, Estrogen, Progestrone and Lactone.

UNIT V - HUMAN EMBRYOLOGY – II (15 Hrs)

Abortion-types; Infertility – Types and methods of treatment- IUI, GIFT, ZIFT-Test tube Baby – IVF, Embryo Transfer, Twins, Cloning-Birth Control methods- Embryonic Stem Cell & its applications, stem cell bank.

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 Delhi.

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

III B.Sc., ZOOLOGY- SEMESTER V

ENTOMOLOGY – Z5ME2

5Hours/Week **Marks: Internal – 25**

Credits: 5 **External – 75**

Total - 100

OBJECTIVE:

To learn about the classification, biology and control of insects and to appreciate the importance of insects

UNIT I: TAXONOMY (15 Hrs)

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

UNIT II: ANATOMY AND METAMORPHOSIS (15 Hrs)

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

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,lac,cantharidin.

UNIT IV: HARMFUL INSECTS (15 Hrs)

Pests-definition, kinds of pests, Brief account & control measures of the following pests:- Household insect pests- Cockroach & silver fish, medically important insects-*Anopheles*, *Culex*, *Aedes*, sand flies and black flies- insects injurious to livestock-Horse flies, Warble flies.

UNIT V: INSECT PEST OFAGRICULTURAL 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. Rajendra Singh, Dr.G.C Sachan, 2012.Elements of entomology, Rastogi Publications,

Meerut, India.

REFERENCES:

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

FATIMA COLLEGE (AUTONOMOUS), MADURAI – 18

III B.Sc., ZOOLOGY - SEMESTER – V

ORNAMENTAL FISH CULTURE - Z5SB3

2hrs/week **Marks: Internal: 50**

Credits: 2 **External: 50**

Total - 100

OBJECTIVE:

To enable the students to be familiarized with ornamental fishes and to motivate them to become entrepreneur

UNIT I – INTRODUCTION TO AQUARIUM (6 Hrs)

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

UNIT II – COMMERCIALLY IMPORTANT SPECIES (6 Hrs)

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

UNIT III – QUALITY MANAGEMENT (6 Hrs)

Water Quality Management- Fish Nutrition – Live feed- *Artemia, Tubifex* and Artifical feed

UNIT IV – DEVELOPMENT AND PARENTAL CARE (6 Hrs)

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

UNIT V – AQUARIUM DISEASES (6 Hrs)

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

TEXT BOOK:

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

REFERENCES:

1. Biswas. S.P., J.N.Das, U.K.Sarkar and Lakra W.S.(2007) Ornamental fishes of North East India : An Atlas : NBFGR
2. Marine Aquarium keeping: The Sciences, Animals and Art. John Wiley & Sons, New York
3. Jhingran,V.G. Fish and Fisheries of India.

4. Bijukumar,A. Rearing of Aquarium Fishes.
5. Rath, A.K. Freshwater Aquaculture,
6. Murthi.V.S. (2002) Marine ornamental Fishes of Lakshadweep CMFRI, Special publication 72
7. Butting. B, Holthus, P.S. Dalding,S.(2003), Marine Aquarium Industry and conservation.

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18.
III B.Sc., ZOOLOGY-SEMESTER V
SERICULTURE – Z5SB4

2 Hrs/ Week **Marks: Internal: 50**
Credits: 2 **External: 50**
Total - 100

OBJECTIVE:

To motivate young minds to become an entrepreneur for practicing sericulture as cottage industry.

UNIT I – INTRODUCTION (6 hrs)

Introduction to Sericulture-Importance of Sericulture-Sericulture in India-Role of Central Silk Board- Sericulture as Cottage industry.

UNIT II – MULBERRY CULTIVATION (6 hrs)

Moriculture-varieties of mulberry, optimum conditions for mulberry growth, planting systems Propagation-Vegetative, Seedling and Micropropagation, Biofertilizers- Triacontanol,Green manuring and Seriboost, Classification of Silkworm-Mulberry and Non mulberry.

UNIT III – SILKWORM REARING (6 hrs)

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

UNIT IV – REELING OPERATIONS (6hrs)

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 - Bacterial diseases-Bacterial Flacherie, Septicemia, Viral diseases- Viral Flacherie, Grasserie, Fungal diseases - Muscardine, Pest of silkworm- Uzifly, Dermestid Beetles.

TEXT BOOK

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

REFERENCES:

1. S. Krishnaswamy, (1988). Sericulture Manual 1, 2 &3, FAO Publications, NewDelhi.
2. G. Sreerama Reddy,(1994). Silkworm Breeding, Oxford & INH Publishing Co Pvt. Ltd., NewDelhi.
3. G. Boraiah, (1994).Lectures on Sericulture, SBS Publishers distributors, Bangalore.

4. G.Ganga and J. Sulochana Chetty, (2005). An introduction to sericulture, second edition, Vijay Primlani for Oxford & IBH Publishing & Co. Pvt. Ltd., New Delhi

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

III B.Sc., ZOOLOGY –SEMESTER VI

IMMUNOLOGY - Z6CC14

5hrs/ week **Marks: Internal-25**
CREDIT-5 **Exetrnal-75**
Total - 100

OBJECTIVE

To understand the immune system and immune response involved in human body. To help students develop the skills necessary for the critical analysis of contemporary on topics related to health and disease.

UNIT- I – IMMUNITY (15 Hrs)

Immunity, Types - Innate and acquired - Immunization schedule - children and HPV adults - Primary and secondary lymphoid organs - Immune cells - Types and functions of T cells, B cells and macrophages.

UNIT- II - ANTIGENS AND ANTIBODIES (15 Hrs)

Nature of antigens and super antigens, antigenicity and immunogenicity - factors influencing immunogenicity - adjuvants and haptens - Immunoglobins - structures and functions of immunoglobulin classes.

UNIT- III - ANTIGEN ANDANTIBODY INTERACTIONS (15Hrs)

Antigen and Antibody interactions, Precipitation, Agglutination, Cytolysis and opsonisation - Immunological techniques: Single immunodiffusion, Double immunodiffusion, Radioimmunoassay, Immunoelectrophoresis and ELISA.

UNIT- IV - IMMUNE RESPONSES (15 Hrs)

Immune responses - Humoral and cell mediated immune response - Complement - Classical and Alternate pathways - Monoclonal antibodies - Hybridoma technology - Transplantation - Types of grafts.

UNIT-V - IMMUNE DISEASE (15 Hrs)

Autoimmune disease – Rheumatoid Arthritis - Immunodeficiency diseases - HIV - Hypersensitivity reactions - Type I - anaphylactic reactions, Type II - cytotoxic reactions, Type III - immune complex reactions, Type IV - delayed type hypersensitivity reactions.

TEXT BOOK

1. Dulsy Fatima, (2004), A Textbook of Immunology, Saras Publications, Kanyakumari

REFERENCE BOOKS

1.I. M. Roitt Volumes, (2001), Essential Immunology, S. Chand & Company Ltd, New Delhi.

2. Benjamini E., Sunshine G and Leskowitz S., (1996), Immunology: A short course. 3rd ed., Wiley-Liss Inc, New York.
3. Goldsby R. A., Kindt T.J., Osborne B.A and Kuby J., (2003), Immunology 5th ed., W. H. Freeman and Company, New York.
4. Chakravarthy A.K., (2006), Immunology and Immunotechnology, Oxford University Press, India.
5. R. C. Dubey and D. K. Maheshware, (2004). A Textbook of Microbiology S. Chand & Company Ltd, New Delhi.
6. Pelczar, M. JE. C., S. Chan and Kreig, N.R. (1980). Microbiology, 5th edition. McGraw-Hill Book Co., Singapore.
7. Nandini Shetty., (2005), Immunology : Introductory text book. New AgeInternational Publishers, India.

FATIMA COLLEGE (AUTONOMOUS), MADURAI – 18
III B.Sc., ZOOLOGY - SEMESTER - VI
BIOTECHNOLOGY - Z6CC15

5hrs/week **Marks: Internal : 25**
Credits : 5 **External: 75**
Total - 100

OBJECTIVE:

To familiarize the use of the techniques of engineering and technology in Biology for the study of living organisms, to modify products or processes for specific use. Also, to find solution of problems concerning human activities including agriculture, medical treatment, industry and environment

UNIT I: INTRODUCTION OF BIOTECHNOLOGY (15 Hrs)

An introduction to Biotechnology, Definition of Biotechnology, Biotechnology as an interdisciplinary pursuit, History and scope of Biotechnology, Applications of Biotechnology, Biosafety guidelines and Containments - Brief account on Intellectual Property Rights.

UNIT II: TOOLS AND TECHNIQUES IN BIOTECHNOLOGY (15 Hrs)

Basic steps of recombinant DNA technology (Insulin production), Enzymes involved- Ligase, restriction endonuclease, polymerase, modifying enzymes- Klenow fragment, Alkaline phosphatase, DNA methylases. Vectors – pBR322, Phage& Cosmids, Coupling tools- adaptors, Linkers and Homopolymer tailing. Gene transfer mechanisms –Transformation, Electroporation, Liposome mediated transfer & Microinjection. Polymerase chain reaction (Working Principle only)

UNIT III: ANIMAL CELL CULTURE TECHNIQUES (15 Hrs)

Basic techniques in animal cell culture and organ culture, Primary Culture and Cell lines, Culture media- Natural and Synthetic, Cryopreservation of cultures. Stem cells: culture, types and applications. Agarose and Polyacrylamide Gel Electrophoresis, Southern, Northern and Western blotting, DNA Fingerprinting-RFLP.

UNIT IV: APPLIED BIOTECHNOLOGY-I (15 Hrs)

Production of human healthcare products – Insulin, Vaccine (Genetically engineered vaccine - Hepatitis B vaccine, FMD vaccine, & Edible vaccine) - Application of Biotechnology in Agriculture - Biofertilizer –VAM fungi: Mass production and Field applications - Biopesticide - *Bacillus thuringiensis* as a pest control.

UNIT V: APPLIED BIOTECHNOLOGY-II (15 Hrs)

Application of Biotechnology in Industry, Single cell Protein- Methods of Production & applications of *Spirulina*. Environmental Biotechnology- Sewage treatment-Primary,

Secondary & Tertiary treatment, Composting-Indore & Bangalore method, Bioremediation-Methods-In situ Bioremediation, Composting, Land Farming & Digestion in above ground reactors.

TEXTBOOK

1. Kumaresan.V, 2005, Biotechnology, Saras Publication, Nagercoil.

REFERNCES

1. Brown, T.A. (1998). Molecular Biology Labfax II: Gene Cloning and DNA Analysis. IIEdition, Academic Press, California, USA.
2. Glick,B. R.and Pasternak,J.J. (2009).Molecular Biotechnology -Principles and Applications of Recombinant DNA. IV Edition, ASM press, Washington, USA.
3. Griffiths, A.J.F., J.H. Miller, Suzuki, D.T., Lewontin, R.C. and Gelbart, W.M.(2009). An Introduction to Genetic Analysis. IX Edition. Freeman and Co., N.Y., USA.
4. Snustad, D.P. and Simmons, M.J. (2009). Principles of Genetics. V Edition, JohnWiley and Sons Inc.
5. Watson, J.D., Myers, R.M., Caudy, A. and Witkowski, J.K. (2007). RecombinantDNA- Genes and Genomes- A Short Course. III Edition, Freeman and Co., N.Y.,USA.
6. Beauchamp, T.I. and Childress, J.F. (2008). Principles of Biomedical Ethics. VIEdition, Oxford University Press.

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

III B.Sc., ZOOLOGY - SEMESTER VI
MAJOR PRACTICALS III - Z6CC16

6 hrs/week **Marks: Internal–40 Marks**
Credits: 6 **External-60Marks**
Total - 100

BIOCHEMISTRY

1. Preparation of solutions – Percentage, Normality, Molarity, Molality, ppm, preparationof working standard from stock solution.
2. Qualitative analysis of Carbohydrates: Barford's Test, Fehling's test, Seliwanoff's testand Iodine test.
3. Qualitative analysis of Proteins: Biuret test, Ninhydrin test and Sakaguchi's test.
4. Qualitative analysis of lipids: Saponification Test, Iodine Absorption test, Salkowski's Testfor Cholesterol and Dunstan's Test for Glycerol.
5. Qualitative analysis of Ketone bodies – Rothera's Test.
6. Estimation of Glucose by Anthrone method.
7. Estimation of Protein by Lowry's method.

MOLECULAR BIOLOGY

1. Isolation of Genomic DNA from Bacteria.
2. Isolation of RNA from Yeast.
3. **Spotters:** DNA Double Helix Model, DNA Replication

BIOPHYSICS & INSTRUMENTATION

1. Verifying Beer - Lambert's law using Colorimeter.
2. pH metry - Titration curve, Estimation of pH of different juices – Buffer preparation –Phosphate buffer
3. Qualitative analysis of phytoconstituents using Ascending paper and Circular paper chromatography
4. Qualitative analysis of amino acids using Thin Layer Chromatography
5. Plasmolysis
6. Separation of cell components using centrifuge
7. Guidelines of handling radioactive isotopes
8. **Spotters:** Descending Chromatography, Colorimeter, Centrifuge

EMBRYOLOGY

Spotters: Embryonic stages of Chick (24 or 48hrs); Mammalian Sperm and Ovum, Stages of Human embryo and Placenta of goat.

ENTOMOLOGY

1. Collection and Preservation of Insects.
2. **Spotters:** Mouth parts of Cockroach & Honey bee; Life Cycle of Holometabolous and Hemimetabolous Insects (one example each), Pests of Agricultural Importance – Rice Weevil, Rhinoceros Beetle.

IMMUNOLOGY

1. Preparation of antigen
2. Separation of serum and plasma
3. Separation of lymphocytes from peripheral blood and counting in Haemocytometer
4. Single radial Immunodiffusion
5. Rheumatoid factors – Demo **Spotters:** Lymphoid organs, Ig – Models

BIOTECHNOLOGY

1. Isolation of genomic DNA from goat liver.
2. Isolation of Plasmid DNA by alkaline lysis method.
3. Electrophoretic separation of DNA.
4. Demonstration of PCR.
5. **Spotters:** Agarose gel electrophoresis, SDS-PAGE, pBR322, Spirulina and Insulin

BIOSTATISTICS

1. Calculate the Measures of central tendency & Measures of dispersion.
2. MS Excel (Demo)

BIOINFORMATICS

1. Sequence retrieval
2. Pairwise alignment - BLAST
3. Molecular visualization of Proteins

HUMAN GENETICS

1. **Spotters:** Edward's and Patau's Syndrome, Pre-natal diagnosis: Amniocentesis, Chorionic villus sampling.

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, 1st ed., Himalaya Publishing House

Pvt. Ltd., Mumbai.

4. Dutta A., (2009) Experimental Biology Lab manual, Narosa Publishing House, New Delhi.
5. Plummer T.D., (1990) An Introduction to Practical Biochemistry, 4th ed., Mc Graw Hill Book Company, Europe.
6. Palanivelu P., (2004) Analytical Biochemistry and Separation Techniques – A laboratory manual for B.Sc and M.Sc students, 3rd ed., Kalaimani Printers, Madurai.

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FATIMA COLLEGE (AUTONOMOUS), MADURAI -18
III B.Sc., ZOOLOGY- SEMESTER VI
BIOSTATISTICS - Z6ME3

5 hrs/ Wk **Marks: Internal : 25marks**
Credits : 5 **External : 75 marks**
Total - 100

OBJECTIVE:

To study the statistical significance data and analysis of the Biological aspects in life.

UNIT I- COLLECTION & CLASSIFICATION OF DATA (15 Hrs)

Introduction-Collection of data – primary & secondary, methods of data collection, methods of sampling-Classification of data- Types: geographical, chronological, qualitative & quantitative.

UNIT II - MEASURES OF CENTRAL TENDENCY (15 Hrs)

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

UNIT III. PRESENTATION OF DATA (15 Hrs)

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

UNIT IV. CORRELATION & REGRESSION (15 Hrs)

Correlation analysis-Pearson's Correlation Coefficient (problems)-Regression analysis- Simple Linear Regression (problems) -Chi- Square Test.

UNIT V. TEST OF VARIANCE (15 Hrs)

MS Excel – statistical functions- t-test –ANOVA- one way and two ways- Introduction to SPSS.

TEXT BOOK:

P.Ramakrishnan, (2010). Biostatistics, Saras publication, Nagercoil, Tamil Nadu.

REFERENCES:

1. Khan I.A and Khanum A,(2004).Fundamentals & Biostatistics, 2nd ed., Ukaaz Publications, Hyderabad.

2.N.Gurumani, (2010). An Introduction to Biostatistics, MJP Publishers, Chennai. 3.Satguru Prasad,(2012). Elements of Biostatistics, Rastogi publications, Meerut.

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18

III B.Sc., ZOOLOGY- SEMESTER VI

CLINICAL LABORATORY TECHNIQUE- Z6ME4

5 hrs/ Wk **Marks: Internal : 25marks**

CREDITS : 5 **External : 75 marks**

Total : 100 marks

OBJECTIVE:

Job oriented course on the methods of testing the clinical samples.

UNIT I **(15 Hrs)**

Clinical diagnosis of the following diseases: Bacterial diseases- Typhoid, Cholera, TB- Viral diseases- Swine flu, dengue, chikungunya and AIDS.

UNIT II **(15 Hrs)**

Basic needs of clinical laboratory, safety regulation, common laboratory accidents, first aid. Urine: Brief account on U.T.I - Composition of urine collection, preservation, Reaction specific gravity, sugar, albumin, bile salts, bile pigment, urea, uric acid, Creatinine and ketones - Microscopic examinations – deposits – RBC, casts, pus cells crystals.

UNIT III **(15 Hrs)**

Blood**:** Collection of blood, counting of cells (TC and DC), Hb, ESR, PCV - Common blood parasites (malaria and elephantiasis) - Blood grouping and Rh typing.

UNIT IV **(15 Hrs)**

Faeces**:** Specimen collection – microscopic examination – ova, cysts occult blood, parasitic infestation – amoebic dysentery - Sputum**:** Examination of normal and pathological sputum.

UNIT V **(15 Hrs)**

Semen analysis: microscopic examination, motility, counting - STD: syphilis, gonorrhea - Amniocentesis**:** Need, procedure for collection and Karyotype studies.

TEXT BOOK:

Ramnik S., Medical Laboratory Technology

REFERENCE BOOKS

1. Text Book of Preventive Medicine – J. E. Park, Benansider Bhanot – Napier Town
2. Introduction of Medical Laboratory Technology – Baker F. J. Silverton
3. Medical Laboratory Technology –Lynch
4. Medical Laboratory Technology- Kanai L. Mukherjee Vol I, II, III
5. Medical Laboratory Manual of tropical countries – Monica Cheesbrough
6. A Hand Book of Medical Laboratory Technology – V. H. Talib

7. Manual of Laboratory Tests – June H. Cella
8. Manual of Basic Techniquws for a Healthy Laboratory – Published by W.H.O. in 1980 Academic Publishers, Calcutta – 700 073.
9. Text Book of Microbiolgy - Maccie and Maecculin.
10. Text Book of Parsitology – Dr. Chatterji.

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

III B.Sc., ZOOLOGY –SEMESTER VI

BIOINFORMATICS - Z6ME5

5hrs/ week **Marks: Internal-25**
Credit-5 **External-75**
Total 100

OBJECTIVE

To enable the students to appreciate the significance of computational programs in the development and analysis of biological database

UNIT I – BASICS OF COMPUTERS ANDBIOLOGICAL DATABASES (15Hrs)

Introduction- Definition, History, and scope -World wide web - web page –Browsers - search engines - Internet protocol - TCP/IP - Biological Database-classification of databases- Nucleotide sequence database: Genbank.

UNIT II – PROTEIN DATABASES (15Hrs)

Protein sequence database: SWISSPROT - Secondary database: PROSITE, structural database- PDB, Human genome project.

UNIT III – PAIRWISE ALIGNMENT (15Hrs)

Similarity and homology – Scoring matrices (PAM&BLOSUM), Local alignment, Global alignment – gapped and ungapped alignment - BLAST & FASTA.

UNIT IV – MULTIPLE SEQUENCE ALIGNMENT (15Hrs)

Introduction to Multiple sequence alignment – methods and applications. Phylogenetic analysis: rooted and unrooted tree, UPGMA algorithm.

UNIT V – PROTEIN STRUCTURE PREDICTION (15Hrs)

Secondary structure prediction: Chou – Fasman method, GOR method – *In silico* structure prediction of proteins - Homology modeling.

TEXT BOOK:

1. Attwood T.K and Smith P.D.J., Introduction to Bioinformatics (2001). 1st ed., Pearson Education Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. Andrews D. Baxevanis,(2003). A practical guide to the analysis of genes and proteins. Wiley-Interscience.
2. David W. Mount, (2001). Bioinformatics – Sequence and Genome Analysis. Cold Spring Harbor Laboratory Press, New York.
3. S.C. Rastogi, N. Mendiratta and P. Rastogi, (2004). Bioinformatics: Methods and applications. Prentice – hall of India Private Limited, New Delhi.

FATIMA COLLEGE (AUTONOMOUS), MADURAI – 18

III B.Sc., ZOOLOGY - SEMESTER - VI

HUMAN GENETICS - Z6ME6

5hrs/week **Marks: Internal 25**

Credits: 5 **External 75**

Total: 100

Objective:

To study the modes of inheritance of congenital disorders and their preventive measures

UNIT I: CYTOGENETICS (15 Hrs)

The Human Chromosome - structure and function - Sex Chromatin - Identification of sex chromosome. Karyotyping and its applications - Abnormal Karyotyping – Down's syndrome, Edward's Syndrome, Patau's Syndrome, Klinefelter's syndrome and Turner's syndrome

UNIT II: MODES OF INHERITANCE (15 Hrs)

Growth of Human Genetics-Analysis of genetic disorders - Multifactorial or Polygenic inheritance - Single gene trait Inheritance - Autosomal Dominant Inheritance – Autosomal Recessive Inheritance and Sex linked Inheritance.

UNIT III: BIO-CHEMICAL GENETICS (15 Hrs)

Inborn errors of Metabolism –Mucopolysaccharidoses; Haemoglobinopathies - Pharmacogenetics – Scope, Mechanism of Drug metabolism, Acatalasia, Glucose -6- Phosphate dehydrogenase deficiency, Succinylcholine sensitivity, Malignant hyperthermia and Isoniazid activation.

UNIT IV: CANCER GENETICS (15 Hrs)

Oncogenes – From protooncogenes to cellular oncogenes –Tumour Suppressor genes – Classification and functions of Oncogenes – Chromosomal aberrations in Cancer.

UNIT V: CLINICAL GENETICS (15 Hrs)

Prenatal diagnosis and treatment, Genetic Counselling – Postnatal diagnosis and treatment-neural tube defect, new born blood spot screen- Gene therapy for Sickle Cell anemia and Cystic fibrosis.

TEXT BOOK:

1. S.D. Gangene, (2012). Human Genetics. Fourth Edition. Elsevier, New Delhi.

REFERENCE BOOK:

1. Michael R. Cummings, (2009). Human Genetics. Cengage Learning India Private Limited,New Delhi.

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

III B.Sc., ZOOLOGY- VI SEMESTER

APICULTURE- Z6SB5

2 Hours/Week **Marks: Internal: 50**

Credits: 2 **External: 50**

Total - 100

OBJECTIVE:

To enable the students to be familiarized with Bee keeping techniques and to motivate them to become entrepreneur

UNIT I – BEE TYPES (6 Hrs)

Introduction to Apiculture - Scope of Apiculture - Honey bee types: *Apis dorsata, A.florea, A. cerana indica, A.mellifera* and *Trigona iridipennis.*

UNIT II – BEE COLONY (6 Hrs)

Bee colony - Queen, Drones and Workers - Structure of mouthparts and sting – Life cycle of Honey bee.

UNIT III – BEE HIVES (6 Hrs)

Bee keeping methods - Primitive beekeeping - Modern hives - Langstroth hive and Newton's hive - Bee keeping equipments.

UNIT IV – BEE PRODUCTS (6 Hrs)

Products of Apiculture - Nutritional and medicinal values of honey - Extraction of honey, Preservation and storage of honey - bee wax and bee venom.

UNIT V – BEE ENEMIES (6 Hrs)

Enemies of bees: Wax moths, Wax beetles and black ants - Bee diseases: Brood diseases, Fungal brood disease - Relationship between plants and Bees.

TEXT BOOKS:

1. Jayashree, K.V. Tharadevi, C.S & Arumugam, N. 2014. Apiculture, Saras Publication, Nagercoil, Tamil Nadu.
2. Jayasurya *et al*., 2013. Economic Zoology, Saras Publication, Nagercoil, Tamil Nadu.

REFERENCES:

1. Roger. A.M,1978. The complete guide to Beekeeping, Pelham books LTD, London.
2. N. Nagaraja & D.Rajagopal, 2009. Honey Bees- Diseases, Parasites, Pests, Predators &their management, MJP Publishers, Chennai.
3. R. C. Mishra, 1998.Perspectives in Indian Apiculture, Agro Botanica, New Delhi.

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18

III B.Sc., ZOOLOGY- SEMESTER VI

DAIRY FARMING - Z6SB6

2Hours/Week **Marks: Internal : 50**

Credits: 2 **External : 50**

Total :100

OBJECTIVE:

To enable the students to be familiarized with management of high yielding cow species, preparation of value added products using milk and to motivate them to become anentrepreneur

UNIT I – INTRODUCTION (6 Hrs)

Introduction to dairy farming, Scope of dairy farming, dairy animals - Cows (Red Sindhi, Jersy & Holstein Friesian, Buffaloes (Murrah& Surti), Goat (Jamuna pari & Malabari), cloning of cow.

UNIT II -MANAGEMENT OF DAIRY BARN (6 Hrs)

Dairy house, management of new born calf - management of Heifer - management of milk cow, Feeding & breeding management

UNIT III - STERILIZATION OF MILK (6 Hrs)

Nutritive value of milk, Milking machine, Lactometer, Pasteurization - Methods of Pasteurization & advantages

UNIT IV - MILK PRODUCTS (6 Hrs)

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

UNIT V- LIVESTOCK DISEASES (6 Hrs)

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

TEXT BOOK

1. Applied Zoology, (2015). Arumugam N, Murugan T, Johnson Rajeswar J and Ram Prabu R, Saras Publication, Kanyakumari.

REFERENCES:

1. Uma Shankar Singh, (2008). Dairy Farming. Anmol Publications, New Delhi
2. ICAR, Hand book of Animal Husbandry, The Indian Council for Agricultural Research, New Delhi

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