

FATIMA COLLEGE (AUTONOMOUS)



**Re-Accredited with “A” Grade by NAAC (3rd Cycle)
74th Rank in India Ranking 2019 (NIRF) by MHRD
Maryland, Madurai- 625 018, Tamil Nadu, India**

NAME OF THE DEPARTMENT: ZOOLOGY

NAME OF THE PROGRAMME : B.SC

PROGRAMME CODE : UAZO

ACADEMIC YEAR : 2020-21

PART – III -MAJOR, ALLIED & ELECTIVES – 95 CREDITS**MAJOR CORE COURSES INCLUDING PRACTICALS : 60 CREDITS**

S.N O	SEM .	COURSE CODE	COURSE TITLE	HR S	CREDI T	CIA Mks	ES E 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.N O	SEM	COURSECODE	COURSE TITLE	HR S	CREDI T	CIA Mk s	ES E Mk s	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 ORGANIC ANALYSIS	2	2	40	60	100
5.	III	19Z3ACQ1	PLANT DIVERSITY & PATHOLOGY	3	3	40	60	100
6.		19Z3ACQ2	LAB - PLANT DIVERSITY & PATHOLOGY	2	2	40	60	100
7.	IV	19Z4ACQ3	DEVELOPME NTAL BOTANY & PLANT BREEDING	3	3	40	60	100
8.		19Z4ACQ4	LAB - DEVELOPME NTAL BOTANY & PLANT BREEDING	2	2	40	60	100

PART – IV – 20 CREDITS

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

S.No	SEM	COURSECODE	COURSE TITLE	HR S	CREDI T	CIA Mk s	ES E Mk s	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

PART – V – 1 CREDIT**OFF-CLASS PROGRAMME****ALL PART-V****Shift I**

- Physical Education
- NSS
- NCC
- Women Empowerment Cell
- AICUF

Shift II

- Physical Education
- Rotaract
- Women Empowerment Cell
- AICUF
- Youth Red Cross / NSS

Kindly retain your respective Part V

OFF-CLASS PROGRAMME**ADD-ON COURSES**

COURSE CODE	Courses	Hrs.	Credits	Semester in which the course is offered	CIA Mks	ES E Mks	Total Marks
	COMPUTER APPLICATIONS (offered by The department of PGDCA for Shift I)	40	2	I & II	40	60	100
	ONLINE SELF LEARNING COURSE- Foundation Course for Arts	40	3	I	50	-	50

	ONLINE SELF LEARNING COURSE- Foundation Course for Science	40	3	II	50	-	50
	ETHICAL STUDIES- Value Education	15	2	III-VI	50 each Semester	-	100
	HUMAN RIGHTS	15	2	V	-	-	100
	OUTREACH PROGRAMME- Reach Out to Society through Action ROSA	100	3	V & VI	-	-	100
	PROJECT	30	4	VI	40	60	100
	READING CULTURE	10/Semester	1	II-VI	-	-	-
	MOOC COURSES (Department Specific Courses) * Students can opt other than the listed course from UGC-SWAYAM UGC / CEC	-	Minimum 2 Credits	-	-	-	-
	TOTAL		22 +				

III B.Sc Zoology

S.N O	SEM	COURSE CODE	COURSE TITLE	HR S	CRE DIT	CIA Mk s	ES E Mk s	TOT · MKs
1.	V	Z5CC11	CORE SUBJECT (1) BIOCHEMISTRY	6	5	15	5	5
2.		Z5CC12	(2) MOLECULAR BIOLOGY	5	5	15	5	5
3.		Z5CC13	(3) BIOPHYSICS & INSTRUMENTAT ION	4	4	15	5	5
4.		Z5ME1/ Z5ME2	MAJORELECTIV E(1) EMBRYOLOGY/ ENTOMOLOGY	5	5	15	5	5
5.		Z5SB3	SKILL BASED SUBJECT(1) ORNAMENTAL FISH CULTURE	2	2	30	10	10
6.		Z5SB4	(2)SERICULTUR E	2	2	30	10	10
7.	VI	Z6CC14	CORE SUBJECT (1) IMMUNOLOGY	5	5	15	5	5

8.	Z6CC15	(2) BIOTECHNOLOGY	5	5	15	5	5
9.	Z6ME3 / Z6ME4	MAJOR ELECTIVE (1) BIOSTATISTICS / CLINICAL LABORATORY TECHNIQUE	5	5	15	5	5
10.	Z6ME5 / Z6ME6	(2) BIOINFORMATICS / HUMAN GENETICS	5	5	15	5	5
11.	Z6SB5	SKILL BASED SUBJECT (1) APICULTURE	2	2	30	10	10
12.	Z6SB6	(2) DAIRY FARMING	2	2	30	10	10
13.	Z6CC16	MAJOR PRACTICAL-III	6	6	-	-	-

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	

I B.Sc.
SEMESTER –I

For those who joined in 2019 onwards

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
UAZO	19Z1CC1	Invertebrata	Lecture	5	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 OBJECTIVES

- 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

UNITS:

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

Self –study - Binomial Nomenclature

UNIT II: Acoelomate & Unicellular Organism -I

(15 HRS.)

Phylum – Protozoa: General characters and classification upto class level - Parasitic protozoans: Types of parasites- Malaria, Amoebiasis, Trypanosomiasis, 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 upto class level - Canal system in sponges - Phylum – Coelenterata: General characters and

classification upto class level- Polymorphism in Hydrozoa.

Self –study - General characters of Protozoa

UNIT III: Acoelomate & Multicellular Organisms-II (15 HRS.)

Phylum- Platyhelminthes: General characters and classification upto 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.

Self –study – Morphology of *Taenia solium*

UNIT IV: Coelomate organisms –I (15 HRS.)

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

Self –study - General characters of Annelida

UNIT V: Coelomate Organisms-II (15 HRS.)

Phylum – Mollusca: General characters and classification upto 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.

Self –study - General characters of Echinodermata

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

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 OUTCOMES (CO)

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

NO.	COURSE OUTCOMES
CO 1	Describe the fundamental organization of animals
CO 2	Explain the levels of organization of animal kingdom and origin of metazoan
CO 3	List the general characters of animals from Phylum Protozoa to Phylum Echinodermata
CO 4	Summarize the parasitic protozoans and types of nutrition in Protozoa
CO 5	Classify Coelenterata based on Zooids
CO 6	Narrate the parasitic adaptations of helminth parasites
CO7	Discuss the modifications of foot in Mollusca and water vascular system in star fish
CO8	Organize the diversity of animals from simple to complex through a chart/ model

I B.Sc. Zoology**SEMESTER -I***For those who joined in 2019 onwards*

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDITS
UAZO	19Z1CC 2	CELL BIOLOGY	Lecture	4	3

COURSE DESCRIPTION

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

COURSE OBJECTIVES

- 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.

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.

Self-Study- Compound microscope**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.

Self-Study- Differences between Prokaryotes and Eukaryotes

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

Self-study- Functions of Nucleus**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, 10thEdition, Saras publication, Nagarcoil, Tamil Nadu.

REFERENCES:

1. Kohn N. S., (1979) Elements of Cytology, Freeman Book Co., New Delhi.
2. DeRobertis E.D.P. and DeRobertis. E.M.F., (1988) Cell and Molecular Biology, 8th Edition, International Edition, Hong Kong.
3. Geoffery M. Cooper and Hausman R, (2009) The Cell: A Molecular Approach, Fifth edition, 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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Explain the different types of microscopes.
CO 2	Distinguish between Eukaryotic and Prokaryotic cells.
CO 3	Describe the structure and functions of cell organelles.
CO 4	Outline the steps involved in cellular respiration.
CO 5	Discuss the structure and functions of Nucleic acids.
CO 6	Explain the processes of cell division by mitotic & meiotic phase.
CO 7	Outline the characteristics of Cancer.

I B.Sc. Zoology**SEMESTER -I***For those who joined in 2019 onwards*

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z1CC3	LAB IN INVERTEBRATA & CELL BIOLOGY-	Practical	3	2

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

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, AsconSponge, ObeliaColony, 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

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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Recognizes the levels of organization among Invertebrates.
CO 2	Illustrate the Skill of Dissection of Organisms
CO 3	Recalls the Structure and Functions of Cellular Organelles.
CO 4	Summarize the unique features of different Phyla among Invertebrates.
CO 5	Demonstrate skill of handling Microscopes.

I B.Sc.
SEMESTER -I
(Offered to other major students)
For those who joined in 2019 onwards

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
UAZO	19Z1NME	MATERNIT Y AND CHILD HEALTH	Lecture	2	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 OBJECTIVES

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

UNITS

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.

REFERENCES:

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. Kumaresan, V., Sorna Raj R., *Public Health and Hygiene*. Saras Publication, India.
4. Documentaries from Gandhigram and TINIP Centre
5. Guest Lectures from Family Planning Association of India

DIGITAL OPEN EDUCATIONAL RESOURCES

1. www.healthline.com
2. www.medlineplus.gov

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	List male and female reproductive organs
CO 2	Discuss the various women health related issues
CO 3	Associate the hormonal secretions with the different phases of menstruation cycle
CO 4	Recall the warning signals, major and minor problems during pregnancy
CO 5	Describe the supplementary diet pattern for pregnant and lactating women and children
CO 6	Classify the family planning methods with examples
CO 7	Outline the immunization schedule
CO 8	Describe the causes, symptoms, diagnosis and treatment of six killer diseases and sexually transmitted diseases

I B.Sc.**SEMESTER -II***For those who joined in 2019 onwards*

PROGRA MME CODE	COURSE CODE	COURSE TITLE	CATEG ORY	HRS/ WEEK	CRE DITS
UAZO	19Z2CC4	CHORDATA	Lecture	5	4

COURSE DESCRIPTION

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

COURSE OBJECTIVES

To understand the fundamental organization of Chordates and their diversity.

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

General characters & Classification upto 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 upto 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

[15 HRS]

Protochordates – 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 Ananthakrishnan, 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, NewDelhi.
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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Recall the levels of organization among Chordates.
CO 2	Bring out the general characters and Classification of Chordates.
CO 3	Distinguish between the Classes of Chordates.
CO 4	Identify the Systematic Position of Animals.
CO 5	Evaluate the unique features of each Class of Chordates.

I B.Sc.**SEMESTER -II***For those who joined in 2019 onwards*

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UAZO	19Z2CC5	Genetics	Lecture	4	3

COURSE DESCRIPTION

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

COURSE OBJECTIVES

- 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.

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.

Self-Study-Basis of Mendelian Inheritance**UNIT -II MULTIPLE GENE INHERITANCE, LINKAGE AND CROSSING OVER****(12 HRS.)**

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.

Self-Study-Blood Group**UNIT –III SEX DETERMINATION AND SEX LINKED INHERITANCE
(12 HRS.)**

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*.

Self-Study-Sex determination in Man**UNIT –IV MUTATION AND CHROMOSOMAL ABERRATIONS (12 HRS.)**

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 (12 HRS.)

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:

Meyyan R, (2009). Genetics, Saras publication, 3rd Edition, Kanyakumari, Tamil Nadu.

REFERENCES:

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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Define the different laws of Mendel.
CO 2	Solve the problems related to monohybrid and dihybrid cross.
CO 3	Explain the mechanism of Linkage and crossing over.
CO 4	Outline the concept of sex-linked inheritance.
CO 5	Discuss the types of mutation.
CO 6	Explain different types of syndromes caused by chromosome abnormalities.
CO 7	Identify the effective ways of diminishing the chronic genetic disorders.

I B.Sc.
SEMESTER -II
For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
UGZO	19Z2CC6	LAB IN CHORDATA & GENETICS	Practical	3	2

COURSE DESCRIPTION

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

COURSE OBJECTIVES

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

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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Recognize the levels of organization among Chordates.
CO 2	Classify Chordates upto class level.
CO 3	Distinguish the Mendelian Traits as Dominant and Recessive.
CO 4	Develops the skill of dissecting organisms and displaying.
CO 5	Interprets the Pedigrees.

I B.Sc.
SEMESTER -II
(Offered to other major students)
For those who joined in 2019 onwards

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
UAZO	19Z2NME	MATERNITY AND CHILD HEALTH	Lecture	2	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 OBJECTIVES

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

UNITS

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.

REFERENCES:

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. Kumaresan, V., Sorna Raj R., *Public Health and Hygiene*. Saras Publication, India.
4. Documentaries from Gandhigram and TINIP Centre
5. Guest Lectures from Family Planning Association of India

DIGITAL OPEN EDUCATIONAL RESOURCES

1. www.healthline.com
2. www.medlineplus.gov

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	List male and female reproductive organs
CO 2	Discuss the various women health related issues
CO 3	Associate the hormonal secretions with the different phases of menstruation cycle
CO 4	Recall the warning signals, major and minor problems during pregnancy
CO 5	Describe the supplementary diet pattern for pregnant and lactating women and children
CO 6	Classify the family planning methods with examples
CO 7	Outline the immunization schedule
CO 8	Describe the causes, symptoms, diagnosis and treatment of six killer diseases and sexually transmitted diseases

II B.Sc.
SEMESTER – III
For those who joined in 2019 onwards

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
UAZO	19Z3CC 7	HUMAN PHYSIOLOG Y	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.

DIGITAL OPEN EDUCATIONAL RESOURCES

<https://www.oercommons.org/courses/anatomy-and-physiology-4/view>

<https://www.oercommons.org/courses/anatomy-and-physiology-i/view>

<https://www.youtube.com/watch?v=X3TAR0otFfM>

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Summarize the basic components and functions of the digestive system and their disorders
CO 2	Organise major organs of the respiratory functions and their diseases
CO 3	Describe circulatory system and their functions
CO 4	List the male and female urinogenital system
CO 5	Explain the functional role of neuromuscular system
CO6	Identify the physiological and biochemical role of hormones
CO7	Outline the structure and mechanism of the sense organs

II B.Sc.
SEMESTER –III

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WE EK	CREDITS
UAZO	19Z3CC8	ENVIRONMENTAL BIOLOGY	Lecture	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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Explain the structure and function of the Ecosystems
CO 2	Compare and contrast different types of Ecosystem
CO 3	List the value of soil ecosystem services.
CO 4	Identify the nature and interactions of populations in the ecosystem
CO 5	Explain the method of population limitations
CO 6	Identify how a stable climax community is formed in an ecosystem
CO 7	Infer the importance of Biodiversity and its conservation
CO 8	Show the consequences of Human actions on global environment

II B.Sc.
SEMESTER -III

For those who joined in 2019 onwards

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
UAZO	19Z3SB 1	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

UNITS

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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Identify the different species of earthworm
CO 2	Explain the Biology of earthworms
CO 3	Classify the ecological group of earthworms
CO 4	Elucidate the role of earthworm in diverse applications
CO 5	Describe the Physical, Chemical and Biological properties of Vermicompost
CO 6	Distinguish between Vermicompost, Vermiwash and Vermicast
CO 7	Summarize the methods of Vermicomposting
CO 8	Analyse the economics and prospects of vermiculture as self employment avenues

II B.Sc.**SEMESTER – III****For those who joined in 2019 onwards**

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEG ORY	HRS/WE EK	CREDIT S
UAZO	19Z3CC9	LAB IN HUMAN PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY	MAJOR PRACTI CAL	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 O₂ and CO₂ 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.

DIGITAL OPEN EDUCATIONAL RESOURCES

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6825871/>

<https://www.youtube.com/watch?v=kWRgNNI6xrM>

<https://www.youtube.com/watch?v=frtlN5ZoeNQ>

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Identify the different types of zooplanktons
CO 2	Recall the preparation haemin crystal
CO 3	Estimate the dissolved O ₂ and CO ₂ in given water samples
CO 4	Infer the qualitative estimation of protein
CO 5	Interpret the Qualitative analysis of urea, ammonia and creatinine
CO 6	Demonstration on ECG, BMI Chart
CO 7	Interpret hormonal disorder

II B.Sc.
SEMESTER –III
For those who joined in 2019 onwards

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDIT S
UAZO	19Z3ACQ1	PLANT DIVERSITY, & PATHOLOGY	Lecture	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	- <i>Jatropha</i>

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

Digital open educational Resources:

1. <https://naturalhistory.si.edu/research/botany>

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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Recognize the structure and life cycle of algae and fungi
CO 2	Identify the plant diseases with the help of symptoms and choose the control measures
CO 3	Relate the role of Lichen as pollution indicators
CO 4	Outline the general characters of Bryophytes, Pteridophytes and Gymnosperms
CO 5	Infer the symbiotic relationship between plants and microbes in nitrogen fixation
CO 6	Identify the binomial name with the help of vernacular or common name
CO 7	Relate the various angiospermic plants to their families
CO 8	Make use of economically important locally available plants

II B.Sc.**SEMESTER –III***For those who joined in 2019 onwards*

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGO RY	HRS/WEE K	CREDIT S
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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO1	Construct suitable micro preparations
CO2	Construct sections of given plant materials with illustration and description
CO3	Make use of dissection microscope to display the floral parts of Angiosperms
CO4	Identify specimens and slides from Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms included in the syllabus

**I B.Sc.
SEMESTER –III**

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

PROGRAM ME CODE	COURS E CODE	COURSE TITLE	CATEG ORY	HRS/WE EK	CREDI TS
UAZO	19C3A CZ1	Animal Diversit y, Physiolo gy & 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.,

DIGITAL OPEN EDUCATIONAL RESOURCES

1. <https://www.webmd.com/heart/picture-of-the-heart>
2. <http://www.dnafb.org/1/bio.html>
3. <https://courses.lumenlearning.com/boundless-biology/chapter/laws-of-inheritance/>
4. <https://www.nature.com/scitable/topicpage/gregor-mendel-and-the-principles-of-inheritance-593/>
5. <https://www.jagranjosh.com/general-knowledge/respiratory-system-in-humans-1456486848-1>

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Outline the general characters with of invertebrate and chordata with reference to organization, symmetry, body cavity.
CO 2	Explain the digestive system, role of enzymes, digestion and absorption of Carbohydrates, Protein and Fat in Man.
CO 3	Distinguish between internal and external respiration in context to the mode and transport of gas exchange.
CO 4	Summarize the structure and function of heart, Kidney, eye and ear.
CO 5	Explain the Mendelian Laws Of Inheritance & Allelism

II B.Sc. Chemistry**SEMESTER -III**

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

PROGRA MME CODE	COURSE CODE	COURSE TITLE	CATEG ORY	HRS/ WEEK	CRE DIT S
UAZO	19C3ACZ2	Lab In Animal Diversity, Physiology And Genetics	Allied Practic al	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.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. <https://www.uwlax.edu/biology/zoo-lab/>
2. <http://virtualbiologylab.org/>

3. <https://www.labster.com/simulations/animal-genetics/>

4. <https://libguides.mines.edu/oer/simulationslabs>

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Outline the Laboratory biosafety guidelines and good laboratory practices.
CO 2	Recall the Principle of Compound microscope
CO 3	Dissect and mount the Body setae of Earthworm
CO 4	List out the features of the given spotters <i>Amoeba</i> , <i>Taenia solium</i> , <i>Nereis</i> , <i>Amphioxus</i> (entire), <i>Anguilla</i> (Eel), Toad (<i>Bufo</i>), Cobra, Chamaeleon, Pigeon and various Syndromes.
CO 5	Test for the presence of carbohydrates, proteins and Lipids, Urea and Uric acid in the given sample
CO6	Examine the Haemin Crystal under the microscope
CO7	Recall the structure of human physiological model such as Ear, Eye and heart.

II B.Sc.
SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
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 - Virioids, 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:

5. Pelczar, M.J., Chan, E.C.S and Krieig N.R.,(2008). Microbiology, 5th Edition, Tata McGraw Hill Edition. United States.
6. Tortora G.J, Funke B.R and Case C.L., (2009).Microbiology: An Introduction,11th Edition, United States.
7. Prescott L.M. Harley J.P and Klein D.A., (2010) Microbiology, 8th Edition. New Delhi.
8. Patel A.H. (2008).Industrial microbiology, Macmillan India LTD, Chennai.

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	List out the importance and scope of Microbiology.
CO 2	Explain the types of Culture media.
CO 3	Outline the methods of culturing bacteria.
CO 4	Describe the ultra structure of bacteria.
CO 5	Discuss the gene transfer methods of bacteria.
CO 6	Compare the difference between DNA and RNA viruses.
CO 7	Summarize the microbial production in various industrial products.

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.)**

TEXT BOOK:

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.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. <http://evolution.berkeley.edu/evolibrary>
2. <http://www.nature.com/nature/supplements/insights/evolution/index.html>

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Recall the basic concepts of origin of life on earth.
CO 2	Relate the evidences of evolution by observing the morphology of organisms.
CO 3	Summarize the theories of evolution
CO 4	Interpret the reason for the occurrence of variation
CO 5	Discuss the role of Natural selection in the origin of a new species.
CO 6	Bring out the evolutionary significance of mimicry with suitable examples.
CO 7	Explain the role of isolation in the formation of a new species.
CO 8	Describe the stages of human evolution with reference to human fossils.

II B.Sc.
SEMESTER –IV

For those who joined in 2019 onwards

PROGRAMM E CODE	COURS E CODE	COURSE TITLE	CATEG ORY	HRS/WE EK	CREDIT S
UAZO	19Z4SB 2	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 Recipes

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). *Oyster Mushrooms*. 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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO1	Recognize the scope of mushroom cultivation
CO2	Compare and contrast the edible and poisonous mushrooms
CO3	Explain the nutritional and medicinal values of Mushrooms
CO4	Describe the spawn production methodology
CO5	Develop a model for mushroom farm
CO6	Apply the mushroom cultivation process
CO7	Identify the diseases and competitors in mushroom cultivation
CO8	List the value-added products from mushrooms

II B.Sc.
SEMESTER – IV
For those who joined in 2019 onwards

PROGRAMM E CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
UAZO	19Z4CC12	Lab in Microbiolo gy & 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 and
- 3.
4. Staining - Simple, Negative and Gram Staining
5. Preparation of Media- agar and broth
6. Serial Dilution Technique
7. Isolation of Single Colony using Pour plate, Streak plate, Spread plate.
8. 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. Homologous organs – forelimb and skeletal of vertebrates
7. Analogous – Wing modification
8. Hardy-Weinberg Equilibrium by using beads
9. Natural selection by using beads

REFERENCES:

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

DIGITAL OPEN EDUCATION RESOURCES

<http://www.uwyo.edu/molb2021/virtual-edge/>

<http://www.evo-ed.org/index.htm>

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	List the working Principle and Applications of instruments
CO 2	Demonstration on staining techniques
CO 3	Plan positive and negative aspects of microbes and learning to handle them safely
CO 4	Demonstration on Serial dilution
CO 5	Organise of phylogenetic trees with suitable specimen to develop the analytical skills
CO 6	Identify the different types analogous and homologous organs
CO 7	Interpret the homology and analogy from suitable specimens/models/charts

IB.Sc.**SEMESTER –IV***For those who joined in 2019 onwards*

PROGRAM ME CODE	COURSE CODE	COURSE TITLE	CATEGOR Y	HRS/WEE K	CREDIT S
UAZO	19 Z4ACQ3	DEVELOPMENT AL BOTANY & PLANT BREEDING	Lecture	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, Krebs'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.

Digital Open Educational Resources:

<https://serc.carleton.edu/sp/library/visualizations/examples/48568.html>

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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO1	Illustrate the structure of various tissues and their functions
CO2	Compare and contrast the anatomical differences between the anatomical structures of Dicot and Monocot plants
CO3	Recognize the mechanism of absorption of water and translocation of food in plants
CO4	Summarize the mechanism of photosynthesis and respiration in plants
CO5	Relate phytohormones and their role in plant growth
CO6	Explain the development of male and female reproductive organs in plants and infer flower and fruit setting in plants
CO7	Explain the various techniques in the crop improvement programmes
CO8	Make use of techniques of vegetative propagation and gardening and construct a home garden

II B.Sc.
SEMESTER –IV

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 OUTCOMES

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

NO.	COURSE OUTCOMES
CO1	Illustrate the anatomy of Monocot and dicot stem , root and leaf
CO2	Interpret experimental set ups in plant physiology
CO3	Apply the horticultural techniques of Cuttage and layerage
CO4	Make use of emasculation technique
CO5	Identify specimens and slides from Plant anatomy, Physiology, Embryology , Plant Breeding & Horticulture included in the syllabus.

**II B.Sc.
SEMESTER -IV**

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

PROGR AMME CODE	COURSE CODE	COURSE TITLE	CATEGO RY	HRS/ WEEK	CREDI TS
UAZO	19C4ACZ3	Cell & Molecular Biology	Lecture	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 centromere, 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 Sinauer Associates, Inc.
7. Rastogi S.C.,(2003).Cell and Molecular Biology - Second Edition, New Age International (P) Limited Publishers, Daryaganj, New Delhi.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. <https://teachmephysiology.com/biochemistry/cell-growth-death/dna-replication/>
2. <https://www.nature.com/articles/nature01407>
3. <https://www2.le.ac.uk/projects/vgec/highereducation/topics/cell-cycle-mitosis-meiosis>

COURSE OUTCOMES

NO.	COURSE OUTCOMES
CO 1	Outline the general structure and function of a prokaryotic and eukaryotic cell.
CO 2	Explain the various proposed models regarding the structure of Plasma membrane
CO 3	Explains the structure and function of Nucleus, Mitochondria and Endoplasmic reticulum
CO 4	Summarize the structure and type of chromosome
CO 5	Justify that DNA is a genetic material with the knowledge of Griffith's, Hershey and Chase experiments.
CO6	Recall the structure and types of DNA and RNA
CO7	Summarize the mechanism of translation, transcription and Lac operon concept in Prokaryotes

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/WE EK	CREDITS
UAZO	19C4ACZ 4	Lab In 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.

DIGITAL OPEN EDUCATIONAL RESOURCES

1. http://vlabs.iitb.ac.in/vlabs-dev/labs/zoology_lab/labs/exp1/index.php
2. <https://www.uwlax.edu/biology/zoo-lab/>
3. https://learn5.open.ac.uk/course/format/sciencelab/section.php?name=btm_sdk100
4. <http://virtualbiologylab.org/>

COURSE OUTCOMES

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

NO.	COURSE OUTCOMES
CO 1	Interpret the observation of Simple Mendelian Traits in the class
CO 2	List the features of the given spotters: Stages of Meiosis, Cellular organelles – Mitochondria, Endoplasmic reticulum, Golgi complex, Nucleus.
CO 3	Dissect and mount the Polytene Chromosomes in the Salivary gland of <i>Chironomus</i> larva.
CO 4	Interpret the mitotic stages from the squash preparation in Onion root tip
CO 5	Recall the structure of DNA
CO7	Recall the structure of human physiological models such as Ear, Eye and heart.

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

6 hours/Week

Credits: 5

Marks: Internal – 25

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
Credits: 5

Marks:Internal-25
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 - Transposons.

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- proteasome 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
Credits : 4

Marks: Internal-25
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 radioactivity - 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, Daryaganj, New Delhi, II edition, Page 26-134.
3. David Freifelder, 1990. Molecular Biology, First Narosa Publishing House, Prakash Deep New Delhi, Second Edition, Page: 167-301.

FATIMA COLLEGE (AUTONOMOUS), MADURAI – 18
III B.Sc., ZOOLOGY - SEMESTER - V
EMBRYOLOGY - Z5ME1

5hrs/week
Credits: 5

Marks: Internal 25
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-Morphogenetic 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, Progesterone 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
Credits: 5

Marks: Internal – 25
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 OF AGRICULTURAL CROPS (15 Hrs)

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

methods of control.

TEXT BOOK:

1. 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
Credits: 2

Marks: Internal: 50
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 – COMMERCIALY 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 Artificial feed

UNIT IV – DEVELOPMENT AND PARENTAL CARE (6 Hrs)

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

UNIT V – AQUARIUM DISEASES (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
Credits: 2

Marks: Internal: 50
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, New Delhi.
2. G. Sreerama Reddy,(1994). Silkworm Breeding, Oxford & INH Publishing Co Pvt. Ltd., New Delhi.
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
CREDIT-5

Marks: Internal-25
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 AND ANTIBODY 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. Dulcy 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 Age International Publishers, India.

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

5hrs/week
Credits : 5

Marks: Internal : 25
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. II Edition, Academic Press, California, USA.
2. Glick, B.R. and Pasternak, J.J. (2009). Molecular Biotechnology - Principles andApplications 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. VI Edition, Oxford University Press.

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

5 hrs/ Wk
Credits : 5

Marks: Internal : 25marks
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
CREDITS : 5

Marks: Internal : 25marks
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, gonorrhoea - Amniocentesis: Need, procedure for collection and Karyotype studies.

TEXT BOOK:

1. 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. Silvertown
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 Techniques for a Healthy Laboratory – Published by W.H.O. in 1980
Academic Publishers, Calcutta – 700 073.
9. Text Book of Microbiology - Maccie and Maecculin.
10. Text Book of Parasitology – Dr. Chatterji.

FATIMA COLLEGE (AUTONOMOUS) MADURAI-18
III B.Sc., ZOOLOGY –SEMESTER VI
BIOINFORMATICS - Z6ME5

5hrs/ week
Credit-5

Marks: Internal-25
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 AND BIOLOGICAL 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
Credits: 5

Marks: Internal 25
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
Credits: 2

Marks: Internal: 50
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
Credits: 2

Marks: Internal : 50
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 an entrepreneur

UNIT I - INTRODUCTION (6 Hrs)

Introduction to dairy farming, Scope of dairy farming, dairy animals - Cows (Red Sindhi, Jersey & 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

FATIMA COLLEGE (AUTONOMOUS), MADURAI-18
III B.Sc., ZOOLOGY - SEMESTER VI
MAJOR PRACTICALS III - Z6CC16

6 hrs/week
Credits: 6

Marks: Internal-40 Marks
External-60Marks
Total - 100

BIOCHEMISTRY

1. Preparation of solutions – Percentage, Normality, Molarity, Molality, ppm, preparation of working standard from stock solution.
2. Qualitative analysis of Carbohydrates: Barford's Test, Fehling's test, Seliwanoff's test and 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 Test for 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.
