

ST. MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI
Bachelor of Science (Zoology)
Course Structure (w.e.f 2015-18)

Semester – I

Part	Components	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil	15ULTA11	Cheyyul, Elakkanam, Urainadai, Sirukathi, ElakkiaVaralaru	6	3	50	50	100
	French	15ULFA11	Paper – I French Language and Culture					
II	English	15UGEN11 (Stream A/B/C)	General English	6	3	50	50	100
III	Core – I	15UZOC11	Invertebrata	4	4	50	50	100
	Core – II	15UZOC12	Chordata	4	4	50	50	100
	Core Practical I	15UZOCR1	15UZOC11 & 15UZOC12	2	2	50	50	100
	Allied I	15UCHA11	Chemistry for Biological Sciences - I	4T+2P	4	50	50	100
IV	Foundation Course	15UFPD11	Personality Development	2	2	50	50	100
				30	22	350	350	700

Semester – II

Part	Components	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max. Marks		
						CIA	ES E	Total
I	Tamil	15ULTA21	Cheyyul, Elakkanam, Urainadai, ValkkaiVaralaru, ElakkiaVaralaru	6	3	50	50	100
	French	15ULFA21	Paper – II French Language and Culture					
II	English	15UGEN21 (Stream A/B/C)	General English	6	3	50	50	100
III	Core – III	15UZOC21	Developmental Zoology and Evolution	4	4	50	50	100
	Core – IV	15UZOC22	Ecology and Toxicology	4	4	50	50	100
	Core Practical II	15UZOCR2	15UZOC21 & 15UZOC22	2	2	50	50	100
	Allied I	15UCHA21	Chemistry for Biological Sciences - II	4T+2P	4	50	50	100
	Allied Practical	15UZOAR 1	15UCHA11 & 15UCHA21		2	50	50	100
IV	Foundation Course	15UFVE21	Value Education	2	2	50	50	100
V	NCC/NSS/SPORTS				1			
				30	25	400	400	800

Semester – III

Part	Components	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil	15ULTA31	Cheyyl, Elakkanam, Puthinam, ElakkiaVaralaru	6	3	50	50	100
	French	15ULFA31	Paper – III French Language and Civilisation					
II	English	15UGEN31 (Stream A/B/C)	General English	6	3	50	50	100
III	Core V	15UZOC31	Biochemistry	4	4	50	50	100
	Core Practical III	15UZOCR3	15UZOC31	2	1	50	50	100
	Allied II	15UBOA31	Angiosperm Taxonomy and Medicinal Botany	4T+2P	4	50	50	100
	SBE	15UZOS31	Basics of Computers	2	2	50	50	100
	NME	15UZON31	Basic Nutrition	2	2	50	50	100
IV	Foundation Course	15UFES31	EVS	2	2	50	50	100
	Self Study Course(optional)	15UZOSS1	Food Science and Technology		+1	-		+100
				30	21+1	400	400	800+100

Semester – IV

Part	Components	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil	15ULTA41	Cheyyul, Elakkanam, Urainadai, Naadagam, ElakkiaVaralaru	6	3	50	50	100
	French	15ULFA41	Paper – IV Initiation to French Literature					
II	English	15UGEN41 (Stream A/B/C)	General English	6	3	50	50	100
III	Core - VI	15UZOC41	Cell Biology	4	4	50	50	100
	Core Practical IV	15UZOCR4	15UZOC41	2	1	50	50	100
	Allied II	15UBOA41	Plant Biotechnology	4T+2P	4	50	50	100
	Allied Practical	15UBOAR1	15UBOA31& 15UBOA41		2	50	50	100
	SBE	15UZOS41	Vermitechnology	2	2	50	50	100
	NME	15UZON41	Health Education	2	2	50	50	100
IV	Foundation Course	15UFYM41	Yoga and Meditation	2	2	50	50	100
V	Extension Activity				+1			
	Self Study Course (optional)	15UZOSS2	Value Added Fishery Products		+1	-		+100
				30	23+2	450	450	900+100

Semester – V

Part	Subject	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max .Marks		
						CIA	ESE	Total
III	Core VII	15UZOC51	Animal Physiology	6	5	50	50	100
	Core VIII	15UZOC52	Genetics	6	5	50	50	100
	Core Elective I	15UZOE51	Aquaculture/Apiculture	5	5	50	50	100
	Core Elective II	15UZOE52	Biotechnology / Medical Laboratory Technology	5	5	50	50	100
	Core Practical V	15UZOCR5	15UZOC51&15UZOC52	4	3	50	50	100
	SBE	15UZOS51	Medical Nutrition Therapy	4	3	50	50	100
	Self Study Course(Compulsory)	15UZOSS3	Wildlife Conservation	-	+1	-	100	100
				30	26+1	300	400	700

Semester VI

Part	Subject	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max .Marks		
						CIA	ESE	Total
III	Core IX	15UZOC61	Immunology and Microbiology	6	5	50	50	100
	Core X	15UZOC62	Biostatistics and Bioinformatics	6	5	50	50	100
	Core XI	15UZOC63	Project/Biodiversity and Conservation	6	5	50	50	100
	Core Elective III	15UZOE61	Sericulture/Poultry Science	6	5	50	50	100
	Practical VI	15UZOCR6	15UZOC61,15UZOC62 & 15UZOE61	6	3	50	50	100
					30	23	250	250

No. of Credits : 140
 Self Study Courses : 1+2
 Extension Activities : 1
 Total Credits : 144

SEMESTER I			
Part – III Core I: Invertebrata			
Code: 15UZOC11	Hrs /Week : 4	Hrs/Sem : 60	Credits : 4

Objectives

- To elucidate the importance of Taxonomy
- To understand the fundamental organization and the economic importance of invertebrates.

- Unit I Protozoa and Porifera**
Introduction to principles of Taxonomy- Binomial nomenclature.
General characters and outline classification upto classes with examples.
Type study: Paramecium : morphology, nutrition, osmoregulation, excretion. Reproduction - binary fission and conjugation.
General topic : Life cycle of Plasmodium, canal system in sponges.
- Unit II Coelenterata**
General characters and outline classification upto classes with examples.
Type study : Obelia – External characters and life history
General topic: Polymorphism in coelenterates, types of coral reefs
- Unit III Platyhelminthes, Aschelminthes & Annelida**
General characters and classification upto classes with examples
Type study : Earthworm – morphology
General topic: Life history of *Fasciola hepatica*, Nematode parasites of man.
- Unit IV Arthropoda**
General characters and classification upto classes with examples.
Type of study: Penaeus–external characters–reproductive system and life cycle.
General topic: Social life in honey bees.
- Unit V Mollusca & Echinodermata**
General characters and classification upto classes with examples.
Type study: Star fish – external characters – water vascular system
General topic: Larval forms of echinoderms and their phylogenetic significance. Cephalopods are advanced molluscs

Text Books

1. Nair, N.C. , Leelavathi, S & Soundara Pandian. N A 2006. Text book of Invertebrates, Saras Publication, Nagercoil.
2. Murugan, T. & Arumugam, N. 2006. Saras Publication, Nagercoil.

Books for Reference

1. Jordan, E.L. and P.S. Verma, 2007. Invertebrate Zoology, S.Chand, New Delhi.
2. Mary, S.Gardiner 1972. The Biology of Invertebrates, Mc Graw-Hill Book Company.
3. Robert, D. Barnes. 1982. Invertebrate Zoology, Holt Saunders, International Editions.
4. Kotpal, R.L, Rastogi & Company. 1972 Zoology Phylum Series, Subhash Bazar, Meerut.
5. Ekambaranatha Iyer, M. and T.N. Ananthakrishnan. 1977. A Manual of Zoology – Vol.I. S.Viswanathan, Pvt Ltd.
6. Jordan, E.L and P.S Verma. 1969. Invertebrate Zoology, S. Chand and Company Limited, New Delhi.

PRACTICALS

Hrs / Week - 1

- I. Dissections
Cockroach : Digestive system and nervous system
- II. Mountings
Cockroach : Mouth parts , spiracles and salivary glands
Prawn : Appendages
- III. Spotters
 - a) Study of the following specimens to bring out their adaptations to their respective modes of life
Fasciola hepatica , *Wuchereria bancrofti*, leech, nauplius, mysis, cercaria larva
 - b) Study of following specimens to bring out their biological significance
Obelia, bipinnaria larva
 - c) Study of the following to indicate the structure and functions
Paramecium, Penaeus, Octopus
- IV. Collection and submission of any five specimens (Photograph / Specimen)

SEMESTER I			
Part – III		Core II: Chordata	
Code: 15UZOC12	Hrs/Week:4	Hrs/Sem: 60	Credits:4

Objectives

- To provide a basic knowledge on the fundamental organization of chordates.
- To impart information on the basic concepts of chordate diversity

Unit I Protochordates and Cyclostomes

General characters of chordates (diagnostic characters and additional characters)
classification upto classes

Prochordata: General characteristics and classification upto orders with examples.

External features and Biological significance of Ascidian and Balanoglossus.

Salient features of cyclostomes – Petromyzon

Unit II Pisces

General characteristics and classification upto sub – classes with examples.

General Topic: Food fishes

Amphibia:

General characteristics and classification upto orders with examples.

Type study: Frog

General topic: Parental care in Amphibia.

Unit III Reptilia

General characteristics and classification upto order level.

General topic: Poisonous and non-poisonous snakes of South India-

Identification, biting mechanism, nature of poison and treatment.

Unit IV Aves

General characteristics and classification upto subclass level

Type study - *Columba livia* – external characters, exoskeleton, flight muscles, respiratory system.

General topic: Migration in birds

Unit V Mammalia

General characteristics and classification upto sub – classes with examples.

Type study: Rabbit – morphology – dentition – digestive system – respiratory system – structure of heart, structure of brain – urino-genital system.

General topic: Adaptations of aquatic mammals.

Text Book

1. Thangamani.A, PrasannaKumar. S.Narayanan.L.M, Arumugam.N 2006 Chordata , Saras Publication

Books for Reference

1. Ekambaranatha Iyer.M Ananthakrishnan,T.N S. 1969Manual of Zoology Vol II Viswanathan Pvt Ltd
2. Jordan E.L and Verma P.S 2006. Chordate Zoology S.Chand & Co Ltd, New Delhi.
3. Newman. H.H 1987. The Phylum Chordata, Satish Book Enterprise, Motikala.
4. Prasad S.N 2005 .Vertebrate Zoology, Kitab Mahal Private Ltd , Allahabad-3.
5. Vishwanath 1967 A Text Book of Zoology Volume II [Chordates] S.Chand & Co. Madras.

PRACTICALS

Hrs / Week – 1

1. Dissections and mountings:
 - Shark - Placoid scales
 - Teleost fish - ctenoid and cycloid scales
 - Frog : Arterial and venous system (Chart)
 - Frog - Brain (Chart)
 - Feathers - Observation of barbs and barbules
2. Demonstration of virtual dissection
3. Museum specimens: slides/models/charts.
 - Amphioxus, Balanoglossus, Ascidian Petromyzon, Narcine, Hippocampus, Rhacophorus, Draco, Typhlops, cobra, king fisher, bat.
4. Identification of any three food fishes

SEMESTER I			
Part III		Allied –I: Chemistry for Biological Sciences - I	
Code: 15UCHA11	Hrs/Week : 4	Hrs/ Sem : 60	Credits : 4

Objectives:

- To know the various compounds used in our day-to-day life.
- To learn the basic methods employed in metallurgy.
- To study the chemistry of fertilizers and pesticides.
- To know about the drugs and its uses in our day to day life.

Unit I **Industrial Chemistry**

Fuels – classification – gaseous fuels like water gas, producer gas, liquefied petroleum gas, gobar gas, compressed natural gas.

Hardness of water – temporary and permanent hardness, disadvantages of hard water –softening of hard water – Zeolite process, Ion exchange method, Demineralization process, Reverse osmosis and Electrodialysis – Sterilisation of water for domestic use by chlorine, ozone and UVlight.

Unit II **Applied chemistry**

Soaps – manufacture of soap(toilet , transparent and liquid soaps).

Detergents – classification – difference between soaps and detergents.

Disinfectants and antiseptics – distinction – types – structure and application of common disinfectants – phenol – dettol – lysol-thiomersal – gentian violet – benzalkonium chloride – cetylpyridinium chloride – formaldehyde – glutaraldehyde – chloramines – Preparation of tooth powder – boot polish – gum paste – sealing wax – Ink – chalk – agarbathis – talcum powder.

Unit III **Metallurgy**

Ores and Minerals – types of ores – methods of ore dressing- roasting – calcinations – reduction (aluminothermic) – smelting – purification by electrolysis and ion exchange method – oxidative refining – zone refining – Kroll process – types of furnaces – Extraction , properties and uses of titanium – vanadium – thorium. Preparation of Titanium tetrachloride, Vanadium pentoxide, Thorium nitrate

Unit IV **Agricultural Chemistry**

Fertilizers – role of micro and macro nutrients in plant growth – characteristics and importance of manures – preparation and uses of urea, ammonium sulphate, CAN, DAP, super phosphate and mixed fertilizers – biofertilizers.

Pesticides – insecticides – fungicides – rodenticides – bactericides and herbicides – preparation and uses of lead arsenate, Bordeaux mixture, zineb, epsam and aluminium phosphide.

Unit V Food Additives and Adulteration

Food additives, characteristics, food colours – natural food colorants, artificial food colourants, non sugar sweet substances, intentional food additives — acids, bases and their salts – and stabilizers, bleaching, maturing agents, leavening agents, humectants.

Adulteration — definition — common adulterants and their identification in food — milk, meat, oils, ghee, coffee powder, asafoetida ,chilli powder, turmeric powders, pulses — natural food poisons — hair dye.

Books for Reference

1. Soni P.L, 2006 Textbook of Inorganic chemistry, Sultan Chand and Company, NewDelhi, Edition
2. Puri, B.R. Sharma, L.R. Kalia, K.C. 2010 Principles of Inorganic Chemistry, Milestone publishers and distributors, Delhi.
3. Puri B.R, Sharma and Pathania, 2013. Elements of Physical Chemistry, Vishal publishing Co.
4. Bagavathi Sundari K, 2006. Applied Chemistry, MJP Publishers, Tamil Nadu Book House, Chennai.,.
5. Siva Sankar B. 2002. Food processing and Preservation, Prentice-Hall of India Pvt. Ltd., New Delhi.

SEMESTER I			
Part-IV Foundation Course: Personality Development			
Code: 15UFPD11	Hrs/Week: 2	Hrs/Sem: 30	Credits: 2

Objectives

- To set a vision for realizing humanness and its inner strength
- To understand and accept one's own personality and to grow in self formation

Unit I

Personality

The Self – Adolescent: Need of the Adolescent – Obstacles to Adolescent – Understanding oneself – Psychology of human life. What makes me? Goal in Life-Meaning of Life – Ambition - Individuality Personality Development : Healthy personality – Knowing oneself – Self – Acceptance – Self - Image

Unit II

Interpersonal Relationships

Characteristic and Elements of personality patterns – Dynamics of Inter- Personal – relationships – analysis of relations of different ego states – analysis of strokes and life positions – Socialization – Friendship – Infatuation - Peer groups – Harmful – Friendship.

Unit III

Motivation

Introduction – relevance and types of motivation – motivating others

Unit IV

Stress Management

Introduction – causes and impacts of stress – managing stress – conflict management – introduction – causes and management

Unit V

Time Management

Time as a resource – identify important time management wasters – individual time management styles – techniques for better time management

Books for Reference

Marie Mignon Mascarenhas, 1983 Family Life Education Value Education, All India Association for Higher Education CREST, Bangalore.
 AIACHE – human Values development Programme, New Delhi
 John Antony, D. Self Psychology Counselling, Anugraha Publications
 Lall and Sharma, Personal Growth Training and Development, Excel Books.
 Janakiraman, Training and Development, Biztantra
 Hurlock and Elizabeth B, Personality Development, Tata McGraw Hill, 1st Ed
 Sahu R.K, Training for Development, Excel Books, 1st Ed

SEMESTER II			
Part III Core III: Developmental Zoology and Evolution			
Code: 15UZOC21	Hrs/Week: 4	Hrs / Sem: 60	Credits: 4

Objectives

- To acquire knowledge about the developmental process.
- To understand the sequential changes from cellular grade of organization to organ grade of organization in the development of multi-cellular organisms.
- To provide an understanding on the theories and process of evolution.

Unit I Gametogenesis and Fertilization

Gametogenesis – spermatogenesis , oogenesis
 Structure and types of sperm & egg - sperm and egg of chick and man.
 Fertilization – physical, chemical, cytological, and physiological events

Unit II Development and Organogenesis

Development of chick – cleavage, gastrulation and fate map
 Placentation in mammal
 Development of heart and brain in mammal

Unit III Morphogenetic Field and Reproductive Technology

Morphogenetic field, gradient hypothesis
 Infertility, artificial insemination, test – tube babies, cryopreservation, amniocentesis.
 Birth control- contraceptive devices, gamete specific antigen- antibody mediated fertilization block

Unit IV Theories and Evidences of Evolution.

Origin of life Theories of Evolution and their modern concepts - Lamark, Darwin and De Vries. Evidences - morphological, embryological, biochemical and paleontological – geological time scale - chart

Unit V Forces of Evolution and Evolution of Man

Variation, sexual selection-evolutionary significance
 Mimicry and animal colouration.
 Speciation - allopatric, parapatric and sympatric. Isolating mechanisms.
 Evolution of man- cultural evolution of man

Text Books

1. Arumugam. N. 2006 Developmental Zoology, Saras Publication
2. Mohan P. Arora 1991 Organic Evolution, Himalaya Publishing House.

Books for Reference

1. Berril. M.J. 1982. Developmental Biology, Tata McGraw- Hill Publishing Company Ltd.
2. Verma.P.S. and U.K. Agarwal, Chordate Embryology (10th Edition) S.Chand & Company Ltd, New Delhi.
3. Balinsky, B. I. 1981. Introduction to Embryology. Saunders College, Philadelphia.
4. Jay M Savage, 1998, Evolution, Amerind Publishing House Co, New Delhi.
5. Paul Amos Moody ,1997, An Introduction to Evolution, Kalyani Publishers, Ludhiyana
6. Arumugam.N 2001 Evolution , Saras publication

PRACTICALS

Hrs / Week – 1

1. Types of eggs (alecithal, telolecithal and centrolecithal)
2. Observation of developmental stages of an insect
3. Temporary mounting of chick embryo and observation of permanent slides of chick embryo 24,48 ,72, and 96 hours.
4. Museum specimens/ slides/ models and charts:
Sperm of vertebrate, egg of frog and mammal, frog tadpole,
Contraceptive devices – condom, copper T, pills (Mala D).
Placenta in mammals – diffuse, discoidal, zonary and cotyledenary placenta.
5. Animals of evolutionary importance -Peripatus, Limulus and Archaeopteryx.
6. Mimicry: leaf insect, monarch and viceroy butterfly.
7. Adaptive colouration – chameleon, lycodon.
8. Fossils-*Nautilus pompilius*, *Physa princepii*

SEMESTER II			
Part - III		Core IV: Ecology and Toxicology	
Code: 15UZOC22	Hrs/Week: 4	Hrs/Sem: 60	Credits: 4

Objectives

- To study the interaction and the interdependence among environmental factors and living organisms
- To understand various toxic agents and their effects on humans and other organisms and their adverse effects

Unit I Ecological Factors

Abiotic factors : Biological effects of temperature and light

Biotic factors : Mutualism, commensalism and antagonism (antibiosis, parasitism, predation and competition) – Biogeochemical cycles: carbon - nitrogen and phosphorous cycles

Unit II Population & Community Ecology

Population - Definition – density – natality – mortality – age distribution – age pyramids – population growth – population equilibrium – population fluctuations – biotic potential – regulation of population density – dispersal – dispersion – population interaction

Community - Introduction – diversity – structure – community dominance – community stratification – periodicity – community interdependence

Ecotone – Edge effect – ecological niche – concepts of community –

Ecological succession

Unit III Habitat Ecology

Aquatic - Freshwater – pond – marine – sandy – rocky - muddy – deep sea - characteristics – fauna , adaptations.

Terrestrial habitat – desert and cave adaptations.

Unit IV Types and Mode of Action of Toxicants

Introduction to toxicology – Definitions – classification of toxicants — mode of action of toxicants – toxicity - application of toxicology.

Unit V Environmental Toxicology

Environmental toxicology – toxicology of solvents – toxic effects of food additives, pesticides, carcinogens, drugs. Environmental toxicology and public health.

Text Books

1. Arumugam.N. 2010. Concepts of Ecology. Saras Publication
2. Saha,T.K. 2008. Ecology and Environmental Biology. Books and Allied (P) Ltd,Kolkata.
3. Mercy P.D. and M.R.Basil .2006 Ecology and Toxicology. Sathana Publications. Nagercoil.

Books for Reference

1. Kumaraswamy.K, Alagappa Moses.A, Vasanthi.M 2004.Environmental Studies Publication Division
2. Prabhakar .V.K 2004.Environmental Education,Anmol publications(P) Ltd, New Delhi.
3. Agarwal.K.C 1999. Environmental Biology,Agro Botanica
4. Verma, P.S. and V.K.Agarwal 2013. Cell Biology, Genetics, Molecular Biology, Evolution & Ecology. S.Chand & Company.
5. Arumugam.N and V.Kumaresan 2014. Environmental Studies, Saras Publication.
6. Verma and Agarwal 1985. Principles of Ecology. S.Chand & Company Ltd, New Delhi.
7. Veer Bala Rastogi and M.S.Jayaraj 1988. Animal Ecology and Distribution of Animals. Kedar Nath & Ram Nath, Delhi.

PRACTICALS

Hrs / Week : 1

1. Estimation of dissolved O₂ in water sample (pond / sea water)
2. Estimation of alkalinity in water sample(pond / sea water)
3. Detection of transparency of water by Secchi disc
4. Museum specimens / slides / models and charts
Mutualism (Hermit crab & Sea anemone)
Commensalism (Echeneis & Shark)
Parasitism (Sacculina on crab)
5. Report on visit to any place of ecological interest – (compulsary).

SEMESTER II			
Part III Allied – I Chemistry for Biological Sciences - II			
Code:15UCHA21	Hrs/Week : 4	Hrs/ Sem : 60	Credits : 4

Objectives:

- To study the importance of colloids and emulsions.
- To have a knowledge about d- and f-block elements.
- To learn about the preparation and uses of some compounds.
- To have an idea about biomolecules and nucleic acids.
- To know about the useful pharmaceutical preparation and its usage.

Unit I Colloids and Emulsion

Colloids – coagulation of colloids – Hardy Schultz law-protective colloids – gold number – Gels – preparation and properties (imbibition, thixotropy, syneresis).
Emulsion – types – emulsifiers – surfactants. Number average and weight average molecular weights – determination of molecular weights by osmotic pressure and light scattering methods.

Unit II Chemistry of d- and f- block elements

d block elements- general characteristics-comparative study of Fe, Co and Ni; Cu, Ag and Au; Zn, Cd and Hg. Ores and methods of extraction of vanadium and cobalt.
f-block elements-general characteristics- lanthanides- sources and separation-lanthanide contraction. Actinides-general characteristics-trans actinide elements.

Unit III Preparation and Uses of Some Useful Compounds

Preparation and uses of sodium carbonate, sodium bicarbonate, Potassium cyanide, basic Beryllium acetate – preparation and uses of basic Lead carbonate or white Lead, basic Lead sulphate, green vitriol, blue vitriol, gypsum, plaster of paris, milk of lime, quick lime, epsom, lithophone

Unit IV Biomolecules

Carbohydrates – classification – configurations of D-glucose, D-fructose, D-mannose and D-galactose (structures only) – interconversions of glucose and

fructose – interconversions of arabinose and glucose – epimerization – mutarotation – general study of starch and cellulose.

Proteins – Amino acids – classification-essential amino acids – isolation from proteins – peptide linkage – polypeptides – colour reactions – structure.

Unit V Pharmaceutical Chemistry

Drugs – Definition – Importance of some common drugs with examples – mouth washes (hydrogen peroxide) – antacids (aluminium hydroxide and magnesium silicate) – analgesics(aspirin) – antipyretics (paracetamol) – sedatives (Diazepam) and hypnotics(barbiturates) Anaesthetics(chloroform) – Basic requirements of anaesthetics – Classification with examples – Antiseptics (alum- boric acid – zinc oxide-potassium permanganate – gentian violet – dettol) and disinfectants- distinction between antiseptics and disinfectants-anticancer drugs.

Books for Reference

1. Arun Bahl, B.S.Bahl, G.D.Tuli, 2008. Essentials of Physical Chemistry- S.Chand and Company Ltd., New Delhi-Revised edition
2. Puri B.R., L.R. Sharma, K.C. Kalia, 2010 Principles of Inorganic Chemistry, Milestone publishers and distributors, Delhi.
3. Puri B.R, Sharma and Pathania, 2013 – 2014. Elements of Physical Chemistry, Vishal publishing Co.
4. Sharma, B.K. 2003 Industrial Chemistry Goel Publishing House, Meerut.
5. Tewari, K.S. N.K. Vishnoi, S.N. Mehrotra. 1998. A Text Book of Organic Chemistry, 2nd Revised Editions.
6. Jayashree Ghosh, 2003Text Book of Pharmaceutical Chemistry S.Chand and company, New Delhi.

SEMESTER I/II			
Part – III Allied Chemistry Practicals			
Code:15UCHAR1	Hrs/Week : 2	Hrs/ Sem : 30	Credits : 1

Objective:

- To help students to acquire practical skill in qualitative and quantitative analysis.

Organic Analysis:

Analysis of simple organic compounds

a) Nature of the compound- Aromatic / Aliphatic

b) Test for Saturation/ unsaturation.

c) Characterization of functional groups (Acid, phenol (solid), aldehyde, ester, carbohydrates).

Volumetric Analysis

I. Acidimetry — Alkalimetry

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of HCl /H₂SO₄ using standard oxalic acid.

II. Permanganometry

1. Estimation of Ferrous ion using standard Ferrous ammonium sulphate.
2. Estimation of sodium oxalate /oxalic acid using standard Oxalic acid.

III. Complexometry

1. Estimation of Zinc using standard Zinc sulphate.
2. Estimation of Magnesium using standard Magnesium sulphate.

Books for Reference:

1. Vogel's Textbook of Quantitative Chemical Analysis, 2004 sixth Edition
2. Advanced Practical Chemistry - Raghupati Mukhopadhyay, Pratul Chatterjee 2007 Books and Allied (P) Ltd. Third Edition.

SEMESTER II			
Part – IV Foundation Course: Value Education			
Code: 15UFVE21	Hrs/Week: 2	Hrs/Sem: 30	Credits: 2

Objectives

- To help students to imbibe the best cherished behaviour pattern as individuals, citizens and members of the community
- To develop high ethic standards and moral values

Unit I

Me-Myself-College-Life and Values-on protests and demonstration – on beliefs – ethical matters – Values – internalization of values – transformation of self.

Unit II

Life Enrichment skills; Purpose for life – sensitization towards gender equality, physically challenged, intellectually challenged. Respect to age, experience, maturity, family members, neighbours, Co-Workers.

Unit III

Forgiveness, Integrity, Humility, Truthfulness, Sacrifice, Sincerity, Self Control, Altruism, Scientific vision.

Unit IV

Constitutional or national values – democracy, socialism, secularism, equality, justice, liberty, freedom, fraternity. Social values, self control universal brotherhood. Religions-Path to God, Religions – Expressions of God Experience- Religious Tolerance. Art: The Meaning of the term – Nature and Function of Art-Art Appreciation-Art for a fuller living – Modern Art – Art and Morality.

Unit V

Control of mind through

- Simplified physical exercise
- Meditation – objectives, types, effect on body, mind & soul
- Activities
 - Moralization of desires
 - Neutralization of anger
 - Eradication of worries
 - Benefits of blessing
 -

Books for Reference:

1. AIACHE – human Values development Programme, New Delhi
2. Thomas Anchukandam, Grow Free Live Free, Krisu Jyoti Publications, Salesians, Bangalore, 1998
3. John Antony D. Self Psychology Counselling, Anugraha Publications
4. Raghunathan, N.S. 2015 Value Education, Margham publications, Chennai
5. Marie Mignon Mascarenhas, 1983 Family Life Education Value Education, All India Association for Higher Education CREST, Bangalore.

SEMESTER III			
Part – III		Core V: Biochemistry	
Code: 15UZOC31	Hrs/Week: 4	Hr/Sem: 60	Credits: 4

Objectives

- To carve an integrated approach to chemistry related to the significance of various biomolecules.
- To understand independent molecules and antioxidants and their implications.

Unit I Carbohydrates
Carbohydrates - outline classification, monosaccharides (glucose and fructose), glycoside linkage, disaccharides (sucrose, lactose) and polysaccharides (cellulose and glycogen), properties, biological significance and functions.

Unit II Protein
Classification of amino acids based on the structure of side chain.
Protein, classification based on shape and structure, chemical bonds involved in structure, Linderstrom Lang's structure of proteins, properties, biological significance and functions.

Unit III Lipids
Lipids, classification, simple lipids (triglycerides and waxes), compound lipids (phospholipids, cerebrosides), derived lipids (steroids), properties, biological significance – functions.

Unit IV Enzymes and Vitamins
Enzymes, classification and nomenclature, chemical nature, properties, factors affecting enzyme activity, mechanism of enzyme action, active site, enzyme inhibition, co-enzymes- application of enzymes.
Vitamins: fat soluble and water soluble, sources, dietary requirements and deficiency symptoms.

Unit V Instrumentation
Principle, Technique and applications of pH meter, colorimeter, centrifuge, Electrophoresis (gel) and chromatography (Paper, TLC).

Text Book

1. Dulsy Fatima, L. Narayanan, R.P. Meyyan Pillai, K. Nallasivam, S. Prasannakumar and A. Arumugam 2013. Biochemistry, Saras Publication, Nagercoil.

Books for Reference

1. Satyanarayana.V and U. Chakrapani 2013. Biochemistry Elsevier – Division of Reed Elsevier India PVT. Ltd. and Books and Allied Pvt. Ltd.
2. Ambika Shanmugam.2000. Fundamental of Biochemistry for Medical student, Navabharat offset works, Chennai.
3. Denise R. Ferrier 2011. Biochemistry Wolters Kluwer / Lippincott Williams and Wilkins Philadelphia – Baltimore – Newyork – London
4. Harper, 1988 – Review of Biochemistry 24th edition, Lange Medical Publications, USA.
5. Srivastava.H.S. 2006. Elements of Biochemistry. Rastogi Publications, Meerut.

PRACTICALS

Hrs / Week: 2

1. Qualitative test for proteins.
2. Qualitative test for lipid.
3. Qualitative estimation of carbohydrate.
4. Quantitative estimation of carbohydrate by anthrone method.
5. Separation of amino acid by paper chromatography / ninhydrin method.
6. Measurement of pH.
7. Preparation of buffers – acetic acid, acetate buffer.
8. Model / chart – Structure of amino acid, glucose, fructose, sucrose and cholesterol.

SEMESTER III			
Part – III Allied II Paper 1: Angiosperm Taxonomy and Medicinal Botany			
Code: 15UBOA31	Hrs/Week: 4	Hrs/Sem : 60	Credits: 4

Objectives:

- To study the floral characters with an aim to identify the taxa.
- To know the importance of medicinal plant diversity.

Unit I

Modification of plant parts: root, stem, leaf . Morphology of Inflorescence, flower and fruits.

Unit II

Concept of classification – Natural system- Bentham and Hooker. Vegetative , floral characters and economic importance of : Annonaceae, Rutaceae, Caesalpiniaceae.

Unit III

Rubiaceae , Asclepiadaceae, Euphorbiaceae, Poaceae.

Unit IV

Study of the following plants with reference to the morphology of the useful parts and their importance: *Aloe vera*, *Zingiber officinale*, *Piper nigrum*, *Gymnema sylvestre*.

Unit V:

Extraction methods and medicinal uses of *Eucalyptus*, Castor and Lemon grass oil
Conservation of medicinal plants-*in-situ* and *ex-situ* methods.

Books for Reference:

1. John Jothi Prakash, E. 2001. Medicinal and Aromatic Plants, JPR Publications, Vallioor.
2. John Jothi Prakash, E., K. Venkataraman, 2001. The science of Medicinal Botany, JPR Publications, Vallioor.
3. Kokate C.F., A. P. Purohit & S.R. Gokhale, 2004. Pharmacognosy. Nirali Prakashan.
4. Pandey, B.P. 2000. Economic Botany, S. Chand & Co., New Delhi.
5. Shukla P. and Misra, S.P. 1997. An introduction to Taxonomy of angiosperms, Vikas Pub. House Ltd., New Delhi.
6. Vashista, P.C. 1985. Taxonomy of Angiosperms. S. Chand & Co., New Delhi.
7. Wallis, T. E. 2000. Test book of Pharmacognosy. CBS Publishers.

SEMESTER III			
Part – III		Skill Based Elective: Basics of Computers	
Code : 15UZOS31	Hrs/Week :2	Hrs/Sem : 30	Credits: 3

Objectives

- To develop skills relevant to computer technology
- To be well equipped with up to date knowledge on computer operations and applications.

Unit I **Introductions to World of Computers**

Computers – types – applications – input and output devices – meaning of hardware and software.

Unit II **MS-Word Basics**

Creating documents – saving files - opening documents - printing files –spelling and grammar check – word art.

Unit III **MS – Excel Basics**

Spread sheet – data entry – creating charts and graphs.

Unit IV **MS-Power Point Basics**

Creating Power Point presentation – clip Art – saving – running a slide show

Unit V **Information Network**

Basics of internet communication –Internet browsing – search engines – E - Mail advantages and disadvantages.

Text Books

1. Arumugam N.2010 Introduction to Computers,SarasPublications ,Nagercoil.

Books for Reference

1. Rajaraman V. 1985 Fundamentals of Computers, Prentice Hall of India.
2. Peter Norton, 2009. Introduction to Computers 6th edition, Tata McGraw Hill, New Delhi

SEMESTER - III			
Non Major Elective - Basic Nutrition			
Code : 15UZON31	Hrs / week : 2	Hrs / sem : 30	Credits : 2

Objectives

- To understand the importance of various food stuff
- To acquire knowledge on nutrition related diseases
- To know the special diets for persons suffering from diseases.

Unit I **Macronutrients**

Introduction - protein – carbohydrate – lipid – classification – sources and functions - water – importance – functions.

Unit II **Micronutrients**

Vitamins and minerals - classification – sources and functions

Unit III **Balanced diet**

Nutritional requirements of different age groups – infants – children – adolescence – pregnant and lactating women – Calorific value of food.

Unit IV **Nutritional deficiency diseases**

Marasmus, Kwashiorkor, Vitamin A, B, C, D, E, K – deficiency diseases

Unit V **Diseases and dietary management**

Obesity, coronary heart diseases, diabetes mellitus, hepatitis, hypertension, ulcer, stroke and anemia.

Text Book

1. Sri Lakshmi B. 2011. Dietetics 6 th Edition New age International Ltd. Publ. New Delhi.

Books for Reference

1. Sherman 2010. Chemistry of Food and Nutrition. -Agrobios Publ. Jodhpur, India
2. Blank F.C. 2010 A Text Book of Foods and Nutrition - Agrobios Publ. Jodhpur, India
3. Sumathi R. Mudambi and M.V.Rajagopal. Fundamentals of Nutrition and Diet Therapy. 5 th Edition. New age International Ltd. Publ. New Delhi
4. Swaminathan M. 1988. Principles of Nutrition and Dietetics- Vol. II BAPPCO Ltd. Publ. Bangalore.

SEMESTER –III			
Part – IV Foundation Course: Environmental Studies			
Code: 12UEVS11	Hrs/week:2	Hrs/sem:30	Credits: 2

Objectives

- To make the students environment conscious.
- To sensitize the students about the environmental crisis and environmental protection.
- To create an awareness among the students about sustainable utilization and conservation of natural resources.

Unit I Environment – Natural Resources

Environment – Definition, Components, need for public Awareness, Natural Resources – Renewable and non-renewable. Forest Resources – Uses, Over exploitation, Deforestation, Water Resources – Uses and Conservation, rain water harvesting. Energy Resources – Renewable and Nonrenewable. Solar, Wind and Biomass energy. Role of Individuals in conservation of natural resources.

Unit II Ecosystem

Ecosystem – Concepts, components – Abiotic and Biotic components (Producer, Consumer and Decomposer), Energy Flow – Food chain, food web and Ecological Pyramids, Structure and Function of Grass Land (Terrestrial) and Pond (Aquatic) Ecosystem.

Unit III Environmental Pollution

Definition, causes, effects and control measures of Air Pollution, Water Pollution and Soil Pollution, Nuclear Hazards, Solid Waste Management. Disaster Management – Flood, Earth quake, Tsunami. Role of individuals in the prevention of pollution.

Unit IV Biodiversity and Conservation

Definition and Levels of Biodiversity (Genetical, Ecological and Species Diversity) Values of Biodiversity. Threats and Loss of Biodiversity – Causes. Hot Spots of Biodiversity (with special reference to India). Conservation of Biodiversity – *In situ* and *Ex situ* Conservation.

Unit V Social Issues and Environment

Sustainable Development, Consumerism and Waste Products, Climate Change – Global Warming, Ozone Layer depletion. Waste Land Reclamation. Population Explosion – Family Welfare Programme, HIV / AIDS, The Environment (Protection) Act – 1986. International Union for Conservation of Nature and Natural Resources (IUCN), World Wild Life Fund (WWF), Man and Biosphere Programme (MAB).

Books for Reference:

1. Kaushik, A. and Kaushik, C.P.K., 2004 Perspectives in Environmental Studies – New Age, International Pvt. Ltd., New Delhi.
2. Odum, E.P., 1996. Fundamentals of Ecology, Natraj Publishers, New Delhi.
3. Saha, T.K. 2007 Ecology and Environmental Biology, Arunabha Sen Books & Allied Pvt. Ltd., Kolkata
4. Sharma, 2006. Environmental Biology, Rastogi Publications, Meerut.
5. Miller, Tyller G., 2004 Environmental Science, Thompeson Brooke / Cole, Singapore.
6. Vijayalakshmi, G.S. Murugesan A.G. and Sukumaran, N., 2006 Basic Environmental Science, Manonmaniam Sundaranar University Publications, Tirunelveli.

Part - III Core VI: Cell Biology			
Code: 15UZOC41	Hrs/week : 4	Hrs/sem: 60	Credits: 4

Objectives

- To elucidate the structure and function of cell organelles.
- To understand the cellular and molecular basis of life processes.
- To learn the complexity and harmony of the cell.

Unit I Cell & Plasma Membrane

History of Cell Biology- protoplasm theory- cell theory- prokaryotic and eukaryotic cells. Plasma membrane- structure, chemical composition, specialized structures, functions.

Unit II Cell Organelles

Cytoplasm- cytoskeleton- microtubules, microfilaments. Ultrastructure and functions of mitochondria, golgi apparatus, endoplasmic reticulum, lysosome, ribosome.

Unit III Nucleus

Ultrastructure, composition and functions - nucleus, nuclear membrane, nucleolus, chromosome – types- giant chromosomes- polytene chromosome, lampbrush chromosome. DNA- chemistry - structure and replication.

Unit IV Protein Synthesis

RNA –synthesis, types - tRNA, rRNA, mRNA. Components of protein synthetic machinery- mechanism – initiation, elongation and termination.

Unit V Cell Division

Amitosis – mitosis - meiosis – significance – factors controlling cell proliferation. Cancer - types - characteristics of cancer cells - causes of cancer – diagnosis – treatment - oncogenes.

Text Book

1. Arumugam, N. 2003. Cell Biology. Saras Publications, Nagercoil.

Books for Reference

1. Power, C.B. 2004. CellBiology. Himalaya Publishing House, Mumbai.
2. Verma, P.S. and V.K Agarwal. 2008. Cytology (8th edition). S.Chand and Co Ltd, New Delhi.
3. De Robertis, E.D.P. and Robertis, E.M.F. 1988. Cell and Molecular Biology 9th International Edition, K.M. Varghese Company, Mumbai.
4. Agarwal, V.K. 2008. Molecular Biology. S. Chand & Co Ltd New Delhi.
5. Gupta and Jangir. 2012. Cell Biology, Fundamentals and Applications. Student Edition.

PRACTICALS

Hrs / Week : 2

1. Microscopy- Light microscope and Phase contrast microscope.
2. Preparation of squamous epithelium.
3. Onion root tip squash: Observation of different stages of mitosis.
4. Chironomous larva: Mounting of polytene chromosomes.
5. Study of prepared slides of histology
Columnar epithelium, ciliated epithelium, glandular epithelium, muscle tissue, nervous tissue, cartilage- T.S, bone- T.S.
6. Models /charts - golgi complex, endoplasmic reticulum, lysosomes - polymorphism, mitochondria, ribosome.
DNA – (Watson & Crick model), tRNA.

Semester-IV			
Part – III Allied II: Plant Biotechnology			
Code: 15UBOA41	Hrs/week:4	Hrs/sem: 60	Credits 4

Objectives:

- To provide an opportunity in acquiring knowledge in plant biotechnology.
- To motivate the students to be self-employed.

Unit I

Plant Biotechnology - definition and scope . External morphology, mass cultivation and utilization of *Nostoc* as biofertilizer. Single cell protein. - *Spirulina* Structure , mass cultivation and uses. Yeast as SCP- Production of Baker's yeast

Unit II

Morphology of commercially cultivated mushrooms *Agaricus bisporous* and *Volvariella volvacea* –Nutritional and medicinal values of mushrooms- Mushroom culture media- PDA, MGYP media- Sterilization techniques- maintenance and storage of cultures. Cultivation methods. Storage and importance of mushrooms .

Unit III

Genetic engineering – isolation of specific genes from cell DNA and mRNA, restriction endonucleases Type II, exonuclease and ligases, cloning vectors- P^{BR} 322 ,Ti- plasmid –Structure - *Agrobacterium* mediated gene transfer in plants.

Unit IV

Fermentation – Structure and mode of operation of stirred tank bioreactor. – Industrial production of ethanol and penicillin-Biogas production - KVIC biogas plant-uses.

Unit V

Plant tissue culture – Introduction, totipotency, differentiation – dedifferentiation and redifferentiation. Explants – selection and sterilization, inoculation, incubation, subculture, regeneration of plants from callus, organogenesis, embryogenesis, hardening (general)

Books for Reference:

1. Dubey, R.C. 2004. Textbook of Biotechnology, S. Chand & Company, New Delhi.
2. Gupta, P.K. 1988. Elements of Biotechnology, Rastogi Publications, Meerut.
3. Islam, A.S. 1996. Plant tissue culture, Oxford & IBH Publishing Co., Pvt. Ltd., New Delhi.
4. Kalia Kumar De, 1992. Plant Tissue culture, New central book agency, Calcutta.
5. Kumar, H.D. 1993. Molecular Biology and Biotechnology, Vikas Publishers, New Delhi.
6. Kumaresan, V. 2005. Biotechnology, Saras Publication, Nagercoil.
7. Mitra, S. 1996. Genetic engineering, Macmillan India Ltd., Delhi.

8. Razdan, M.K. 1993. An Introduction Plant tissue Culture, Oxford & IBH Publishing Colours, New Delhi.
9. Reinert J., M. Yeomen 1983. Plant cell and tissue culture, Narosa Publishing house, New Delhi.
10. Singh, B. D. 1998. Biotechnology, Kalyani publishers, Ludhiana.

PRACTICALS

2hrs/week

Demonstration only

1. Mass production of *Nostoc*
2. Mass production of *Spirulina*
3. Structure of White button mushroom- *Agaricus bisporous*
4. Cultivation of White button mushroom- *Agaricus bisporous*
5. Plasmid - pBR 322
6. Ti - Plasmid (octopine)
7. Agrobacterium mediated gene transfer in plants
8. Structure of KVIC Biogas plant
9. Stirred tank fermentor
10. Cleaning and sterilization of glasswares.
11. Callus culture

SEMESTER IV			
Part - III		Skill Based Elective : Vermitechnology	
Code : 15UZOS41	Hrs/Week : 2	Hrs/Sem: 30	Credits : 2

Objectives

- To get a basic knowledge of various aspects of vermicomposting.
- To develop skills in vermicomposting for self-employment.

Unit I Vermiculture Technique

Definition- need for vermiculture-species selection -vermiculture process

Unit II Vermicomposting Technology

Selection of suitable species of earthworm, preparation of worm bed – maintainance of vermicomposting bed- harvesting the worms

Unit III Vermicomposting Methods

Pit method- bin method, windrow method, vermiwash- preparation- composition- applications

Unit IV Vermicompost

Vermicompost- chemical composition, physical and biological features- applications.

Unit V Economic Importance of Earthworm

Earthworm - as bait- as food - in agriculture - in medicines- in laboratory research purpose- benefit to society.

Text Book

1. Gupta P. K. 2012. Vermicomposting for Sustainable Agriculture 2nd Revised Edition, Agrobios, India.

Books for Reference

1. Talashilkar S. C. and Dosani 2005 Earthworm in Agriculture First edition Agrobios Publications, Jodhpur
2. Renganathan L. S. 2006. Vermibiotechnology from Soil Health to Human Health. First edition, Agrobios, India.
3. Prakash Malhotra, Economic Zoology, 2008 First edition. Adhyayan Publishers and Distributers, New Delhi.

SEMESTER - IV			
Non Major Elective - Health Education			
Code : 15UZON41	Hrs / week : 2	Hrs / sem : 30	Credits : 2

Objectives

- To know about the communicable diseases
- To confirm the hygienic method of living
- To make human life livable and enjoyable.

Unit I Health and well being

Definition – concepts of health – dimensions of health – concepts of well being – quality of life index - population explosion in India – birth control measures.

Unit II Food, Water and Air borne diseases

Polio, cholera, amoebiasis, typhoid, tuberculosis, measles – prophylaxis – treatment – control measures

Unit III Vector borne diseases

Dengue fever, malaria, filariasis, sleeping sickness - prophylaxis – treatment – control measures

Unit IV Sexually transmitted and Communicable diseases

Gonorrhoea, syphilis, AIDS, rabies, hook worm infestation - prophylaxis – treatment – control measures

Unit V Health situation in India

Primary health care - Primary health care in India – First Aid with reference to accident, snake bite. Immunization schedule

Text Book

1. Lily Premila C., Chandral S. & Retna Latha Sinazer 2009. Public Health and Hygiene C.S.I. Diocessan Press, Nagercoil.

Books for Reference

1. Mathur J.S. 1971. Introduction to Social and Preventive Medicine Vol. I to V Oxford & I BH Publishing Co.
2. Dubey R.C. & Maheswari D.K. 2009. A Text book of Microbiology S. Chand & Company Ltd.
3. Vijaya Ramesh K. 2007. Food Microbiology MJP. Publishers Chennai.
4. Purohit S.S 1988. Microbiology Fundamentals and Applications Fourth Revised & Enlarged Edition Agro Botanical Publisher India

5. Subramanian V. 2002 A Text Book in Environmental Science. 1st Edn. Narosa Publishing House, New Delhi.

SEMESTER IV			
Part – IV Foundation Course: Yoga and Meditation			
Code: 15UFYM31	Hrs/Week: 2	Hrs/Sem: 30	Credits: 2

Objectives

- To enable students to have good health
- To impart value for mental hygiene and possess emotional stability
- To integrate moral values in order to live a purpose driven life.

Unit I **Physical Character and Functions**

Yoga – Brief introduction – importance of Yoga Life – Simple methods for adopting Yoga in Daily Life Nature Cure: Brief history and principles – Health and Disease – Techniques of Healthy Living Rules & Regulations – asanas, Pranayama, mudra, bandha

Unit II **Exploring the traditions of Yoga:**

The Secret of Change – The Mind: Agent of Change – The Twelve steps of Spiritual Recovery – Raja yoga – Hatha Yoga – Jnana Yoga – Karma Yoga – Bhakthi Yoga – Mantra Yoga – Tantra Yoga – Surya Namaskar

Unit III **Greatness of Life Force**

Philosophy of kayakalpa-physical body- bio magnetism, mind-Kayakalpa practical - sex and spirituality-value of sexual vital fluid, married life-chastity- jeeva Samadhi -intensifying bio magnetism through exercise- lamp gazing-rules- benefits - mirror gazing-rules-benefits, passes for healing.

Unit IV **Self Discipline**

Self-Discipline, Diet: You are what you eat – Yogic and Naturopathic treatment for Common Ailments: Common Cold, Cough, Headache, Constipation, Gastric trouble, Menstrual Disorders – Obesity – And General Steps for being healthy.

Unit V **Special Meditation**

Pranayama – Physiological value of Pranayama – Practice of Pranayama – Nature Meditations

Books for Reference

1. Mind – Vethathiri Maharashi
2. Karma Yoga - Vethathiri Maharashi
3. Sound health through Yoga – Dr. K. Chandrasekar
4. Yoga for Modern Age – Vethathiri Publications
5. Department .of AYUSH, Yogic and Naturopathic treatment for Common Ailments Edi IV, Ministry of Health and Family Welfare, Gove. Of India, 2010
6. Georg Feuerstein & Benda Feuerstein, Yoga: A beginners Guide, Rashmi Graphics, #3, Amrutwel CHS.Ltd Mumbai, 2014

SEMESTER V			
Part - III Core VII: Animal Physiology			
Code: 15UZOC51	Hrs/Week: 5	Hrs/Sem: 75	Credits: 5

Objectives

- To study the basic principles of animal physiology
- To know the anatomy and functioning of various organs and organ systems of animals
- To learn the physical and chemical properties of living matter

Unit I **Digestion and Nutrition**

Intracellular and extracellular digestion – role of enzymes in digestion of carbohydrates, proteins and lipids – absorption of digested food materials – malnutrition.

Unit II **Respiration and Circulation**

Respiration: Types of respiratory pigments – transport of respiratory gases – anaerobiosis - Respiratory Quotient.

Circulation: Composition of blood – blood coagulation – structure of human heart – heart beat – origin and conduction – cardiac cycle – blood pressure.

Unit III **Excretion and Homeostasis**

Excretion: Structure and function of nephron – mechanism of urine formation in man – nitrogenous waste products – ammonotelism, ureotelism, uricotelism – ornithine cycle – dialysis. Osmoregulation in crustaceans and fishes – thermoregulation – mechanisms – ectotherms – endotherms – heterotherms

Unit IV **Muscular, Nervous and Chemical Coordination**

Structure of skeletal muscle and myofibril – molecular organization, mechanism and chemistry of muscle contraction – Cori cycle

Structure of neuron – conduction of nerve impulse - synaptic transmission – neuromuscular junction – reflex action - receptors – photo and phonoreceptors.

Endocrine glands: structure and functions of pituitary, thyroid, adrenal and pancreas.

Unit V **Reproduction and Behavioural Physiology**

Anatomy of reproductive organs in human – ovary – testis – reproductive cycles – hormonal control of reproduction. Animal behaviour – types – learning and learned behaviour – Biological clock – circadian rhythm – circannual and lunar periodicity.

Text Books

1. Maria Kuttikan.A and N. Arumugam 2004. Animal Physiology. Saras Publication.

Books for Reference

1. Sembulingam.K, Prema Sembulingam. 2008. Essentials of Medical Physiology. Jaypee Brothers. New Delhi
2. Rastogi, S.C. 1979. Essentials of Animal Physiology – Wiley Eastern Ltd. New Delhi.
3. William S. Hoar. 1987. General and Comparative Physiology 3rd Edition. Prentice Hall of India (P) Ltd.
4. Verma. P, S.Tyagi and V.K. Agarwal. 2002. Animal Physiology.S.Chand & Company Ltd. New Delhi.
5. Prosser, C. L. and F.A Brown. 1984. Comparative Animal Physiology. Saunders Philadelphia.
6. Sambasivah Kamalakara Rao and Agustin Chellappa. 1983. Animal Physiology S. Chand and Company.
7. Nagabtrushanam.R, M.S. Kodarkar, R. Sarojini. 2002. Text book of Animal – Physiology, Second Edition, Oxford and IBH Publishing Co, Pvt. Ltd.

PRACTICALS

Hrs/Week: 2

1. Human salivary amylase activity in relation to temperature.
2. Effect of temperature on the opercular movement in fish and calculation of Q_{10} .
3. Examination of excretory products (ammonia, urea and uric acid crystals)
4. Rate of oxygen consumption in fish
5. Estimation of haemoglobin by Haemoglobinometer
6. Haemocytometer – Demonstration
7. Kymograph / simple muscle twitch – model
8. Human blood smear (Preparation and observation of different blood cells)
9. Demonstration of blood pressure with sphygmomanometer
10. Slides – sections of skeletal, cardiac, smooth muscle and endocrine glands.

SEMESTER – V			
Part – III		Core VIII: Genetics	
Code : 15UZOC52	Hrs/Week:6	Hrs/Sem:90	Credits:5

Objectives

- To enhance the knowledge of genetic basis of inheritance and variation.
- To create awareness about the hazards of radiation
- To highlight the importance of genetics and welfare of human society.

Unit I Mendelian Genetics

Introduction - Mendelian laws – monohybrid and dihybrid cross – back cross – test cross – incomplete dominance – inheritance of combs in fowls – multiple alleles – ABO blood group – Rh factor in man – Erythroblastosis foetalis – multiple genes – skin colour in man – simple Mendelian traits in man.

Unit-II Sex Determination and Sexlinked Inheritance

Sex determination in Drosophila – genic balance theory – sex determination in man - barr bodies and dosage compensation – sex linked inheritance in man – haemophilia – colour blindness- hypertrichosis – sex limited traits – sex influenced traits.

Unit-III Operon Model and Maternal Inheritance

Regulation of gene expression in prokaryotes - inducible and repressible systems – operon concept of Jacob and Monod – components and control mechanisms of lactose and tryptophan operon – extrachromosomal inheritance – kappa particles in Paramecium – shell coiling pattern in snail Limnaea.

Unit IV Genetic Disorders and Radiation Genetics

Inborn errors in metabolism – phenylketonuria, alkaptonuria- albinism - mutant haemoglobins- sickle cell anaemia – thalassemia – syndromes – autosomal – Down's and Edward's syndrome – sex chromosomal – Turner's and Klinefelter's syndrome. Radiation – sources of natural and artificial radiation – radiation hazards – genetic and biological effects .

Unit-V Genetics and Human Society

Twins – types – importance in nature and nurture studies – pedigree analysis – symbols – construction – genetic counselling – prenatal diagnosis of genetic disorders by amniocentesis- betterment of human society –eugenics – eugenics – euphenics.

Text Book

1. Meyyan .R.P. 2007.Genetics. Saras Publication, Nagercoil.

Books for Reference

1. Winchester, A.M.Genetics 1969. 3rd edition, Oxford and IBH Publishing Co, New Delhi.

2. Gardner, Simmons and Snustad 1991. Principles of Genetics, 8th edition. John Wiley and Sons. Inc. New York.
3. Verma, P.S.and V.K. Agarwal 2008. Genetics, 9th edition, S.Chand and Co Ltd., New Delhi..
4. Alice Marcus 2011 Genetics, MJP Publishers New Delhi.
5. Klug, W.S.and M.R.Cummings 2000. Concepts of Genetics, 6th edition. Prentice Hall, Inc. New York

PRACTICALS

Hrs/Week : 2

1. Verification of Mendel's monohybrid cross using beads
2. Verification of Mendel's dihybrid cross using beads.
3. Observation of simple Mendelian traits in the class population.
4. Analysis of ABO blood group and Rh factor.
5. Demonstration of barr bodies and Lyon's hypothesis
6. Sex linked inheritance of colour blindness and haemophilia (chart)
7. Genetic basis and clinical manifestations of Down's, Klinefelter's and Turner's syndrome (chart).
8. Organization of lac operon (chart)
9. Types of twins (photo).
10. Genetic significance of Drosophila and distinguishing features of males and females (slides).

SEMESTER – V			
Part III	Core Elective I:	Aquaculture	
Code:15UZOE51	Hrs/ Week: 5	Hrs/ Sem:75	Credits: 5

Objectives

- To enumerate aquacultural potential and practices in India
- To impart knowledge on fish culture techniques to augment food production from aquatic resources.

Unit I **Culturable Species**

Scope of aquaculture – aquaculture in India – fresh water, coastal and marine aquaculture. Culturable organisms and their qualities.

Fin fishes – carps, cat fishes and others

Shell fish- shrimp, prawn, crab – edible mussel, pearl oyster.

Cultivable sea weeds

Unit II **Culture Methods and Farm Management**

Extensive, semi - intensive and intensive, monoculture, polyculture, integrated fishfarming – paddy - cum fish culture, animal husbandry - cum fish culture, sewage- fed fish culture. Pond construction and management.

Unit III **Culture Techniques**

Fin fish - culture of Indian major carps

Shell fish - culture of marine prawn, edible oyster, pearl oyster

Unit IV **Fish feed and Disease management**

Fish feed – artificial feed - feed formulation, live feed and their culture- artemia, rotifers, microalgae.

Diseases – bacterial, viral and fungal diseases, ectoparasites and endoparasites - prevention and management, nutritional deficiency diseases.

Unit V **Preservation and Marketing**

Fish preservation – freezing, canning, dry curing, salt curing, smoke curing, irradiation, special cured products.

Marketing- marketing techniques, Government participation-CMFRI, CIFA, CIBA, CIFNET, MPEDA, FSI, Marine biological station, hydro-biological research station, FFDA, NABARD, IDBI

Text Books

1. Santhana Kumar and Selvaraj, A.M. 2006 Concepts of Aquaculture, Mac ram Publications, Nagercoil.

Books for Reference

1. Jhingran, V.G . 1982. 2nd edition. Fish and Fisheries of India, Hindustan Publishing Corporation, Delhi.
2. Khanna, S.S .An Introduction to Fisheries. Central Book Depot, Allahabad.
3. Santhanam, R.M, Sukumaran and Natarajan, P. 1987. A Manual of Freshwater Aquaculture. Oxford & IBH publishing Co Pvt Ltd, Janpath, New Delhi.
4. Dinabandhu Sahoo, S.Z. Qasim. 2009. Sustainable Aquaculture. A.P.H Publishing Co, New Delhi.
5. Agarwal, S.C. 1994. A Hand book of Fish Farming. Naranda Publishing House, Delhi.
6. Chaudhuri , A.B. 2009. Aquaculture Resurgence Birth of Blue Revolution. Daya Publishing House, Delhi.
7. Sailendra Ghosh. 2009. Fisheries and Aquaculture Management. Adhyayan Publisher & Distributors, New Delhi.

Part - III Core Elective I: Apiculture			
Code : 15UZOE51	Hrs / week : 5	Hrs/ sem : 75	Credits : 5

Objectives

- To obtain knowledge of the basic facts on bees and bee keeping
- To provide information essential for management of bees, as it is a rural based and welfare oriented agro based industry.

Unit I Honey bee Types and Biology

Definition - classification of bees – rock bee, Indian bee, European bee, little bee and dammer bee – their identification and habits – choice of species in Apiculture. Bee colony – queen, drones and worker- functions of the members. Life cycle. Food of the bee – honey and pollen – artificial feeding. Behaviour of bees – dances.

Unit II Principles of Apiculture

Arranging an apiary position – space – direction - acquiring bees – care of newly captured colonies – handling the bees - bee comb and its architecture – different kinds of cells. Bee keeping – primitive and modern methods – artificial hives - Langstroth hive and Newton’s hive – their advantages - appliances used in apiaries.

Unit III Honey bee Products

Honey- properties - chemical composition -extraction of honey-preservation and storage of honey – nutritive value- medicinal value – honey as daily food. Bee wax – production – method of extraction – characteristics and uses. Bee venom – methods of extraction – composition of venom – curative value.

Unit IV Enemies and Diseases of Bees

Enemies of bees – greater wax moth, lesser wax moth, ants, wasps, lice, beetles and birds – their control. Diseases of bees –brood diseases- diseases of adult bees- Nosema- clustering disease - septicemia - prevention and control measures - honey bee parasites – control measures.

Unit V Management of Bees

Swarming – prevention and control. Robbing and fighting – prevention and control. Uniting stocks – different methods. Queen rearing and introduction - supersedure - foraging - inter – relationship of plants and animals.

Text Books

1. Johnson, J. and I. Jeya Chandra 2005. Apiculture . Olympic offset Printers, Marthandam.

Books for Reference

1. Mishra. R.C. 1997. Perspectives in Indian Apiculture, Agro Botanica, New Delhi.
2. Pierre Jean – Prost. 1994. Apiculture, Oxford & IBH Publishing Co.Pvt. LTD. New Delhi.
3. Root. R.I. 1985. Encyclopedia of Bee Culture . International Books & Periodicals Supply Service. New Delhi
4. Raja Justus, E 2009 .Economics of Bee Keeping Industry. Rawat Publications, Jaipur and New Delhi.
5. Vasantharaj David. B. 1978. Elements of Economic Entomology. Popular Book Depot, Chennai.

Part –III Core Elective II: Biotechnology			
Code : 15UZOE52	Hrs/Week : 5	Hrs/Sem : 75	Credits : 5

Objectives

- To familiarize with basic concepts and techniques of biotechnology.
- To understand the applications of scientific and engineering processes.
- To gain an insight on the link between biotechnology and welfare of mankind

Unit I Cloning Vectors

Introduction – scope and importance of biotechnology – cloning vehicles – bacterial plasmid vectors - pBR 322 and Ti plasmid – bacteriophage vectors - lambda and M13- animal viral vector - SV40 – role of restriction and modification enzymes.

Unit II Gene cloning and Screening

Gene cloning – methods of introduction of cloned genes into host cells – transformation – liposome mediated transfer – electroporation – particle bombardment gun – viral vector method – DNA library – hybridization technique – blotting techniques - Southern, Northern and Western.

Unit III Animal Cell, Tissue and Organ Culture

Culture media – cell culture techniques - monolayer culture and immobilized culture of cell lines – techniques and applications of human embryonic stem cell culture - organ culture – techniques – tissue engineering of artificial skin and cartilage.

Unit IV Environmental and Bioprocess Technology

Biotechnological methods for sewage and waste water treatment – bioremediation – degradation of xenobiotic (hydrocarbons and pesticides) – role of genetically engineered microbes – biomining – bioleaching – industrial production of penicillin and ethanol.

Unit V Biotechnology and Human Welfare

DNA probes and diagnosis of genetic disorders – DNA finger printing technique – gene therapy and treatment of genetic diseases – vaccines – recombinant DNA vaccines and viral vaccines – Human Genome Project – types – methods of sequencing – potential benefits to mankind.

Text Books

1. Kumaresan, V. 2010. Animal Biotechnology, Saras Publication, Nagercoil.
2. Kumaresan, V. 2009. Applied Animal Biotechnology, Saras Publication, Nagercoil.

Books for Reference

1. Singh, B.D. 2005. Biotechnology, Revised edition, Kalyani Publishers, Chennai.
2. Dubey, R.C. 2006. Text Book of Biotechnology, 4th edition, S. Chand and Co Ltd, New Delhi.
3. Rema, L.P. 2009. Applied Biotechnology, MJP Publishers, Chennai.
4. Shailendra Singh, 2007. Applied Biotechnology, 1st edition, Campus Books International New Delhi.
5. Clark and J. Pazdernik. 2009. Biotechnology, Elsevier Academic Press, California, USA.
6. Ramadass, P. 2009. Animal Biotechnology – Recent Concepts and Development. MJP Publishers, Chennai.

SEMESTER - V			
Part -III		Core Elective II : Medical Laboratory Technology	
Code : 15UZOE52	Hrs / week : 5	Hrs/ sem : 75	Credits : 5

Objectives

- To learn the utility and the applications of the instruments, so as to study the etiology of various diseases affecting human beings.

Unit I GLP and Instrumentation

Good laboratory practices- medical lab layout- norms to be followed in a clinical lab - record maintenance. Sterilization - dry heat (hot air oven), moist heat (autoclave, pressure cooker) and UV radiation (laminar flow chamber). Laboratory equipments – incubator, autoanalyser, micro centrifuge, CT scan and MRI scan.

Unit II Haematology

Collection and storage of blood, composition of blood, preparation and use of blood components - blood groups (A,B,AB,O& Rh factor) - RBC count - WBC count - estimation of haemoglobin and blood cross matching.

Unit III Clinical Pathology

Dialysis - hepatitis test – hemolytic jaundice - analysis of sputum - AIDS (ELISA and WESTERN BLOT) - diagnostic tests for intestinal parasites – Ascaris and Entamoeba – diagnosis of dengue and chikungunya.

Unit IV Biochemical Tests

Estimation of cholesterol, urea, uric acid, creatinine of blood - assay of enzyme alkaline phosphatase - amniotic fluid analysis - amniocentesis, chromosome banding, FISH and L/S ratio.

Unit V Demonstration/ Charts/ Models

Centrifuge - stethoscope - sphygmomanometer, electrocardiogram and echocardiogram- analysis of urine - routine physical examination - glucose and albumin detection- pregnancy test (detection of hCG).

Text Books

1. Ramnik Sood. 2005. Medical Laboratory Technology, Methods and Interpretations, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

Books for Reference

1. Biswajit Mohanty and Sharbari Basu. 2006. Fundamentals of Practical Clinical Biochemistry. B.I Publications Pvt. Ltd., New Delhi.
2. Estridge, B.H., Reynolds A.P and N.J. Walters. 2000. Basic Medical Laboratory Techniques 4th edition. Thomson Delmar Learning Fastern press (Bangalore) Pvt. Ltd., Bangalore.
3. Kannai, L. Mukherjee. 1997. Medical Laboratory Technology Vol-I, Vol-II and Vol-III, Tata Mc Graw Hill Publishing Company Limited, Chennai.

SEMESTER-V			
Part – III Skill Based Elective – Medical Nutrition Therapy			
Code : 15UZOS51	Hrs/Week : 4	Hrs/Sem : 60	Credits : 3

Objectives

- To disseminate information on basic aspects of diet therapy.
- To inculcate aptitude for the planning and preparation of therapeutic diets.
- To instill the spirit of caring sick.

Unit I Diet Therapy

Introduction – principles of diet preparation – normal diet in the hospitals – liquid – semiliquid – light – soft diet – bland diet – regular diet – different types of feeding – oral feeding – tube feeding – IV feeding.

Unit II Therapeutic Diet for Liver and Kidney Diseases

Causes – types – symptoms and principles of dietary management in infective hepatitis and cirrhosis of liver – glomerulonephritis – chronic renal failure - diet in dialysis and renal transplantation.

Unit III Therapeutic Diet for Diabetes and Cardiovascular Diseases

Risk factors – symptoms – principles of planning diet and management of Diabetes mellitus – atherosclerosis – hypertension – congestive heart failure.

Unit IV Therapeutic Diet in Febrile Conditions and Allergy

Febrile condition – short duration – typhoid – long duration – tuberculosis – diet in allergy – definition – classification – common food allergy – test of allergy – diet therapy.

Unit V Therapeutic Diet for Cancer and Burns

Cancer – etiology – symptoms and dietary guidelines – burns – degree of burns – principles of dietary management.

Practical Experience

- Planning, preparing and serving diet.
- Visit to cancer care centre.
- Observation of patients in kidney care and diabetic care centres.

Text Books

1. Mudambi, S.R. and M.V.Rajagopal 2009. Fundamentals of Food, Nutrition and Diet Therapy. New Age International Publishers, 5th edition, New Delhi.

Books for Reference.

1. Gopalan, C.Ramashasthri, B.V. and Balasubramanian 1998. Nutritive Value of Indian Foods, NIN, ICMR.
2. Blank, F.C. 2009. A Handbook of Foods and Nutrition Agrobios (India) Jodhpur, India.
3. Srilakshmi, B. 2009. Human Nutrition (for B.Sc. Nursing Students). New Age International Publisher, New Delhi.
4. Srilakshmi, B. 2010. Dietetics. 6th edition, New Age International Publishers, New Delhi.

SEMESTER -V	
Self Study Course(compulsary) : Wildlife Conservation	
Code: 15UZOSS3	Credit: 1

Objectives:

- To recognize the importance of wildlife.
- To study the techniques of wildlife census.
- To learn the role of Sanctuaries and National parks and to enhance the knowledge in wild life conservation policies

Unit I Need for Conservation

Wildlife of India - causes of wildlife depletion - need for conservation- IUCN categories - endangered species of mammals in India.

Unit II Wildlife Census

Techniques - direct method - line transect method - block count method- indirect method - pellet analysis method - pugmark techniques.

Unit III Zoos

Importance - types of enclosures - food and feeding of Zoo animals - importance of Zoo education.

Unit IV Sanctuaries and National Parks

Definition – importance - Vedanthangal Bird Sanctuary - Mudumalai Sanctuary- Anamalai Sanctuary - National Parks- Guindy Deer Park - Corbett National Park.

Unit V Wildlife Conservation Policies

Wildlife Protection Act 1972 – Introduction – schedules - declaration of Wildlife Sanctuaries and National Parks, Significance of NGO's in wildlife conservation.

Books for Reference

1. Giles, R.H. Jr (Ed). 1984. Wildlife Management Techniques. The Wildlife Society, Washington, D.C. Nataraj Publishers, Dehradun, India.
2. Seshadri, B. 1986. India's Wildlife Reserves. Sterling Publishers, New Delhi.
3. Anubhakaushik and C.P.Kaushik. 2007. Environmental Science &Engineering, Newage International (p) Publishers. New Delhi.
4. Saharia, V.B. 1982. Wildlife in India, Nataraj Publication, Dehradun.
5. Verma, P.S. and V.K. Agarwal. 2008. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Pvt. Ltd, Ram Nagar, New Delhi.
6. Brain Groombridge, 1992. Global Biodiversity, Chapman & Hall, 2-6 Boundary Row, London SE1 8 HN.

SEMESTER -VI			
Part – III Core IX: Immunology and Microbiology			
Code: 15UZOC61	Hrs/week : 6	Hrs/sem: 90	Credits: 5

Objectives

- To familiarize and perceive the importance of immune system, immune organs and immunoglobulins.
- To study the nature of the microbes and to realize their beneficial and harmful effects

Unit I Immunity Types and Lymphoid Organs

History and scope of Immunology. Immunity – types – innate immunity – factors controlling innate immunity – acquired immunity – types – active and passive immunity. Lymphoid organs – thymus - bone marrow – Bursa of fabricius – spleen and lymphnodes.

Unit II Immune Response

Cells of the immune system – development and fate of stem cells - Lymphocytes, B Lymphocytes, T Lymphocytes - types of T cells and macrophages – third population of lymphocytes – Lymphokines - Immune response - humoral - primary and secondary – B cell activation- factors controlling antibody formation - cell mediated immune response – T cell activation – biological functions of cell mediated immunity.

Unit III Antigens and Antibodies

Antigens - definition – epitopes – general properties - cross reactive antigen - heterophile antigen – Frossman antigen – haptens. Antibodies (Immunoglobulins) - definition – basic structure of immunoglobulin – Ig classes - IgG, IgA, IgM, IgD and IgE - biological properties – general functions.

Unit IV Structure, Shape and Culture of Microbes

Importance and scope of Microbiology – classification of bacteria- general structure of bacteria, fungus and virus - culture media, continuous and batch culture techniques - bacterial growth curve.

Unit V Food and Medical Microbiology

Food Microbiology - food poisoning, food spoilage and preservation methods.
Medical Microbiology - causative agent, symptoms, treatment and prevention of diseases. Bacterial diseases - diphtheria, whooping cough, tuberculosis, typhoid, leprosy, gonorrhoea. Fungal diseases – candidiasis and dermatophytosis. Viral diseases - AIDS, poliomyelitis, rabies, chickenpox, measles, hepatitis.

Text books

1. Arumugam N. Mani A., Narayanan L.M., Dulsy Fatima and Selvaraj A.M. 2015. Immunology and Microbiology. Saras Publication, Nagercoil.

Books for Reference

1. Ivan M. Roitt. 1994 Essential Immunology. 6th Edition. ELBS English Language Book Society/ Blackwell Scientific Publications.
2. Rao C.V. 2005 An Introduction to Immunology. Narosa Publishing House, New Delhi.
3. Joshi K.R and Osamo N.O. 1994 Immunology. 4th Edition Agro Botanical Publishers, India.
4. Kannan I. 2007. Immunology. MJP Publishers, Chennai.
5. Surendra Naha, 2012. Fundamentals of Immunology. Dominant Publishers & Distributors Pvt. Ltd., New Delhi.
6. Pelczar, M.J, E.C.S Chan and N.R Krieg. 1986 Microbiology Mc Graw – Hill Book Company, New Delhi.
7. Chakraborty, P.A 1995 Text Book of Microbiology. New Central Book Agency (P) Limited, Kolkata
8. Powar and Dagainawala, 1988 General Microbiology. Himalaya Publishing House, Mumbai.
9. Arti Kapil, 2013. Text Book of Microbiology. 9th Edition. Universities Press (India) Pvt. Ltd.

PRACTICALS

Hours / Week -3

Immunology

1. ABO blood grouping
2. Rh factor typing.
3. Lymphoid organs of rat (chart)
4. Observation of bone marrow cells and identification.
5. Single Radial Immunodiffusion (Demonstration)
6. Double Immunodiffusion (Demonstration)
7. Cells of the immune system – stem cells, lymphocytes, macrophages.

Microbiology

1. Sterilization techniques
2. Preparation of culture media
3. Serial dilution technique
4. Simple staining of bacteria
5. Gram staining of bacteria
6. Hanging drop technique.
7. Study of distribution of microorganisms in nature – soil, water and air.
8. Spotters – autoclave, hot air oven, laminar hood, inoculation needle, agar plate.

SEMESTER - VI			
Part – III Core X: Biostatistics and Bioinformatics			
Code : 15UZOC62	Hrs/Week : 6	Hrs/Sem : 90	Credits : 5

Objectives

- To explore the applications of integration of biology and statistics.
- To acquire skills in analysis and interpretation of data
- To gain a perspective on bioinformatics tools

Unit I **Biostatistics – Collection and Display of Data**

Introduction – populations and samples – types of variables – collection of primary data – survey – census- sampling methods – sources of secondary data – classification of data – frequency distribution – presentation of data – tables - parts -types – diagrams – line diagram – bar diagram – pie diagram – graphs – histogram - frequency polygon - frequency curve – ogives.

Unit II **Measures of Location and Dispersion**

Concept – computation for grouped and ungrouped data – relative merits and limitations of measures of central tendency mean, median and mode – measures of dispersion – range, variance standard deviation, standard error, and coefficient of variation.

Unit III **Statistical Inference and Correlation Analysis**

Probability theory – terminology – types - theorems of probability - chi- square test and goodness of fit – correlation – definition – types – scatter diagram – Karl Pearson’s correlation coefficient – calculation of r value and interpretation – testing the significance of relationship using student’s t-test.

Unit IV **Bioinformatics – An Overview**

Definition – scope – applications of bioinformatics – properties of biological databases –databases retrieval tools – PubMed – Medline – Locuslink – Entrez - SRS

Unit V **Protein and Nucleotide Sequence Databases.**

Protein sequence databases – NCBI – SWISS PROT - nucleotide sequence databases – EMBL – GENBANK - sequence alignment softwares – BLAST – FASTA – applications of bioinformatics tools in research on bioinformatics.

Text Books

1. Arumugam, N. 2010. Biostatistics, Computer Applications, Bioinformatics and Instrumentation, Saras Publication, Nagercoil

Books for Reference

1. Palanisamy. S. and M. Manoharan 1990 Statistical Methods for Biologists, Palani Paramount Publications, Palani
2. Gurumani, N. 2005. An Introduction to Biostatistics, 2nd edition, MJP Publishers, Chennai
3. Agarwal S.K. 2008. Biostatistics, APH Publishing Corporation. New Delhi

4. Arunima Mukherjee 2008. Bioinformatics, Oxford Book Company, Jaipur, India
5. Thiagarajan, B and Pa.Rajalakshmi 2009. Computational Biology, MJP Publishers, Chennai
6. Rajadurai, M. 2010 Bioinformatics – A Practical Manual, PSB Book Enterprises, Chennai

PRACTICALS

Hrs/ Week :3

1. Preparation of a questionnaire and collection of data by survey method.
2. Demonstration of simple random sampling by simulation using students (lottery and table of random number method)
3. Construction of continuous frequency table for the weight / height of students.
4. Diagrammatic presentation of data - simple bar diagram and pie diagram
5. Graphical presentation of data – histogram, frequency polygon and frequency curve
6. Calculation of mean, median, mode, standard deviation, standard error and coefficient of variation using neem leaves
7. Study of probability and chi - square test with two coins tossing experiment
8. Calculation of correlation coefficient and testing its significance
9. PubMed abstract - Print out.
10. EMBL database - Print out.

SEMESTER VI			
Part – III Core XI: Biodiversity and Conservation			
Code: 15UZOC63	Hrs / Week: 6	Hrs/ Sem : 90	Credits:5

Objectives

- To understand the wealth of biodiversity
- To encourage students to know of the merits of conservation of biodiversity

Unit I Biodiversity and its Conservation

Concept of biodiversity : Definition – types of biodiversity – role of taxonomy in biodiversity – value and importance of biodiversity – global and Indian scenario – biodiversity wealth. Biodiversity in various major biomas – landscape and biosphere and their impact on biodiversity – micro and macro level ecosystem and biodiversity.

Unit II Measurement of Biodiversity

Evaluation of biodiversity indices – Shannon – Weiner – dominance – similarity and dissimilarity – association index – biological indicators available in various ecosystem – extinction and endangered species – inventory of biodiversity.

Unit III Biodiversity Convention

Biodiversity convention and conservation : Threat to biodiversity in various countries – biodiversity convention and its impact on the conservation – trends - loss of biodiversity – *in situ*–and *ex – situ* conservation methods.

Unit IV Biotechnology and Biodiversity

Gene bank and biodiversity: Introduction – theory of gene banking preservation – institution of a gene bank – impact of gene bank and its promotion – documentation. Preservation and promotion of biodiversity by adapting genetic engineering practices – transgenic organisms and patenting.

Unit V Intellectual Property Rights and Protection

Intellectual Property Rights such as patents, trade secrets, copy right, trade marks – IPR and genetic resources – GATT and TRIPS

Text Books

1. Krishnamoorthy, K.V. 2003. An Advanced Text Book on Biodiversity Oxford Publishing Co. Pvt. Ltd. New Delhi.

Books for Reference

1. Agrawal, K.C 2000. Biodiversity. Agrobios (India) Pub, Jodhpur
2. Gupta, P.K.1994 Elements of Biotechnology. Rastogi and Co, Meerut.
3. Ananthkrishnan, T.N. and K.G.Sivaramkrishnan,2006 Animal Biodiversity Patterns and Process Scientific Publishers, India.

SEMESTER - VI			
Part - III	Core Elective III	Sericulture	
Code : 15UZOE61	Hrs / week : 6	Hrs / sem : 90	Credits : 5

Objectives

- To know the importance of sericulture
- To give an insight about the art of sericulture and
- To explore the scope for sericulture to adopt it as a vocation after their graduation.

Unit I Introduction

Scope of sericulture - sericulture in India – role of Central Silk Board (CSB), Central Sericultural Research and Training Institute(CSRTI) – Silkworm Seed Technology Laboratory(SSTL).

Unit II Moriculture

Commercial varieties of mulberry - mulberry cultivation – cultivation practices - biofertilizers – foliar spray for mulberry - triacontanol and seriboost.

Diseases of mulberry - bacterial – viral – fungal – nematode and deficiency diseases - pests of mulberry – symptoms and control measures.

Unit III Silk worm rearing

Mulberry silk worm – morphology - development – silk gland. Silk worm rearing – rearing house – rearing appliances – rearing operations – chawki rearing – rearing of late age worms – application of sampoorna.

Unit IV Cocoon Mounting and Marketing

Mountages - mounting methods – harvesting of cocoons – transport of cocoons – physical characters of cocoons – defective cocoons – moth emergence - cocoon markets. Silkworm diseases - bacterial, fungal and viral diseases - pests – symptoms and control measures.

Unit V Silk reeling

Cocoon stifling – methods of stifling – storage of cocoons – deflossing cocoon cooking – reeling operations. reeling appliances – cottage basin – filature units - raw silk testing – silk marketing - by-products of sericulture - uses of silk.

Text Books

1. Ganga G. and J. Sulochana Chetty. 1991. An Introduction to Sericulture. Oxford & IBH Publishing Co Pvt. Ltd. New Delhi

Books for Reference

1. Krishnaswami S.1990. New Technology of Silkworm Rearing. Published by Central Silk Board, Bangalore.
2. Hisao Aruga. 1990. Principles of Sericulture. Published by Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi

3. Tammanna N.Sonwalker. 1993. Hand Book of Silk Technology. Published by Wiley Eastern Ltd. Madras.
4. Dr.Manjeet S. Jolly. 1987. Appropriate Sericulture Techniques. Published by Director, International Centre for Training and Research in Tropical Sericulture, Mysore.
5. Kamal Jaiswal, Sunil P. Trivedi, B.V. Pandey and P.N.Pandey 2009. Indian Sericulture. ALFA Publication, New Delhi

SEMESTER VI			
Part III	Core Elective III:	Poultry Science	
Code: 15UZOE61	Hrs/Week: 6	Hrs/Sem: 75	Credits: 5

Objectives

- To provide knowledge on the fundamentals of poultry management and production
- To create an avenue for self employment

Unit I Breeds of fowl

Role of eggs in human nutrition, different breeds and classes of fowl, choosing commercial layers and broilers – sexing in day old chicks, strategies to maintain profit in broiler farming

Unit II Practical Aspects of Rearing Fowl

Poultry housing, deep litter system, cage rearing, management of chick, broiler , grower and layer, restricted feeding, grit feeding.

Unit III Management of Poultry

Summer management - winter management, forced moulting, , lighting - debeaking of chick- growers- layers and broilers.

Unit IV Poultry Nutrition

Nutritional requirements- energy- proteins and amino acids- vitamins and essential inorganic elements, feed stuffs of poultry, feed formulation– non-nutritive feed additives.

Unit V Disease Management

Poultry diseases - viral- bacterial - fungal and parasitic diseases- prevention and management, vaccination programme, homeopathy in poultry diseases.

Text Books

1. Gnanamani.M.R 2010 Modern Aspects of Commercial Poultry Keeping, Deepam Publication, Madurai.

Books for Reference

1. Gnanamani.M.R 2003 Profitable Poultry Farming, Giri Publication, Madurai.
2. Ravindranathan 2013 A Text Book of Economic Zoology, Wisdom Press, New Delhi.
3. Prakash Malhotra 2008 Economic Zoology, Adhyayan publishers, New Delhi.