

ST. MARY'S COLLEGE (AUTONOMOUS), THOOTHUKUDI
Bachelor of Science (Botany)
Course Structure (w.e.f. 2015-16)

Semester – I

Part	Components	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max. Marks		
						CIA	ESE	Total
I	Tamil/ French	15ULTA 11	Cheyyl, Elakkanam, Urainadai, sirukathai, Elakia Varalaru	6	3	50	50	100
		15ULFA11	Paper –I French Language and Culture					
II	English	15UGEN11 (Stream A/B/C)	General English	6	3	50	50	100
III	Core – I Core – II Core practical I	15UBOC11	Cell Biology and Genetics	4	4	50	50	100
		15UBOC12	Algae and Bryophytes	4	4	50	50	100
		15UBOCR1	Core Practical I (15UBOC11 and 15UBOC12)	2	2	50	50	100
	Allied I	15UZOA 11	Animal Diversity	4+2	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	ESE	Total
I	Tamil/	15ULTA21	Cheyyl, Elakkanam, Urainadai, Valkkai Varalaru, Elakkia Varalaru	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	15UBOC21	Fungi, Lichens and Plant pathology	4	4	50	50	100
	Core – IV	15UBOC22	Embryology and Anatomy	4	4	50	50	100
	Core practical II	15UBOCR2	Core Practical II (15UBOC21 and 15UBOC22)	2	2	50	50	100
	Allied I	15UZOA21	Economic Zoology	4+2	4	50	50	100
	Allied practical I	15UZOAR1	Allied practical (15UZOA11 and 15UZOA21)		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, Elakkana, Puthinam, Elakkia Varalaru	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	15UBOC31	Pteridophytes, Gymnosperms and Paleobotany .	4	4	50	50	100
	Core practical III	15UBOCR3	Core practical III (15UBOC31)	2	1	50	50	100
	Allied II	15UCHA31	Chemistry for Biological Sciences I	4+2	4	50	50	100
	SBE	15UCHS31	Computer Application	2	2	50	50	100
	NME	15UBON31	Preventive Health Care	2	2	50	50	100
IV	Foundation Course	15UFES31	EVS	2	2	50	50	100
Self Study Course (Optional)		15UBOSS1	Renewable Energy Resources		+1	Not to be tested internally		+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	Cheyyl, Elakkanam, Urainadai, Nadagam, Elakkia Varalaru	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	15UBOC41	Taxonomy of Angiosperms	4	4	50	50	100
	Core Practical IV	15UBOCR4	Core Practical IV (15UBOC41)	2	1	50	50	100
	Allied II	15UCHA41	Chemistry for Biological Sciences-II	4+2	4	50	50	100
	Allied Practical	15UCHAR1	Allied Practical 15UCHA31 & 15UCHA41		2	50	50	100
	SBE	15UBOS41	Herbal Health Care Products	2	2	50	50	100
	NME	15UBON41	Preservation of fruits and vegetables	2	2	50	50	100
	Foundation Course	15UFYM41	Yoga and Meditation	2	2	50	50	100
	Extension activity				+1			
	Self Study Course (Optional)	15UBOSS2	Ethno medicine		+1	Not to be tested internally		+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	15UBOC51	Microbiology	6	5	50	50	100
	Core VIII	15UBOC52	Plant physiology	6	5	50	50	100
	Core Practical V	15UBOCR5	15UBOC51, 15UBOC52	4	3	50	50	100
	Core Elective I	15UBOE51	Biostatistics and Biological Techniques	5	5	50	50	100
	Core Elective II	15UBOE52	Molecular Biology and Bioinformatics	5	5	50	50	100
IV	SBE	15UBOS51	Horticulture	4	3	50	50	100
	Self Study Course (compulsory)	15UBOSS3	Pharmacognosy	-	+1	-	100	100
				30	26+1	300	400	700

Semester VI

Subject	Subject Code	Title of the Paper	Contact Hours / Week	Credits	Max .Marks			
					CIA	ESE	Total	
Core IX	15UBOC61	Biochemistry and Biophysics	6	5	50	50	100	
Core X	15UBOC62	Marine Botany	6	5	50	50	100	
Core XI	15UBOC63	Biotechnology	6	5	50	50	100	
Core Elective III/project	15UBOE61	Nutrition and Health	6	5	50	50	100	
Practical VI	15UBOCR6	15UBOC61, 15UBOC62, 15UBOC63	6	3	50	50	100	
				30	23	250	250	500

Total No. of Credits	140
Self Study Papers	1+2
Extension Activities	1
Grand total No. of credits	144

B.Sc. Botany

Semester I			
Core I -Cell Biology and Genetics			
Code: 15UBOC11	Hrs/week: 4	Hrs/Semester: 60	Credits: 4

Objectives:

- To gain basic knowledge on the unit of life.
- To understand the morphology and structure of different organelles of plant cells.

Unit I : Ultra structure of the plant cell, ultra structure and chemistry of cell wall. Plasma membrane – unit membrane structure – Fluid mosaic model. Ultra structure of endoplasmic reticulum and Golgi apparatus

Unit II : Ultra structure and functions of chloroplast, mitochondria, ribosome and nucleus

Unit III : Ultra structure and functions of chromosome. Non-living inclusions-starch grains, cystolith, raphides. Cell division –mitosis and meiosis.

Unit IV : Mendel's laws of heredity with reference to monohybrid and dihybrid crosses. Incomplete dominance (monohybrid). Lethal gene action in maize and mice.

Unit V : Interaction of genes: comb shape in fowls, complementary genes and duplicate factors. Multiple alleles with reference to blood groups (ABO and Rh) in man, multiple factor inheritance – ear size in corn. Sex determination in plants (*Melandrium*).

Text Book:

1. John Jothi Prakash, E. 2010. Principles of Genetics and genetic engineering. Emkay Publications, Delhi.

Books for Reference:

1. Channarayappa. 2010. Celbiology. University Press (India) Private limited.
2. Dnyansagar, V. R. 1986. Cytology and Genetics. Tata Mc Graw – Hill Publishing Company limited, New Delhi.
3. Power, C. B. 2002. Cellbiology. Himalaya Publishing House.
4. Lohar, P. S. 2009. Cell and molecular biology. MJP Publishers. Chennai.
5. Vijendra Das, L. D. 2005. Genetics and plant breeding. New age International (P) limited Publishers.
6. Verma, P.S. and V.K. Agarwal. 2007 Cytology. S.Chand and Co., New Delhi.
7. Verma, P.S. and V.K. Agarwal.1991. Genetics. S. Chand and Co., New Delhi.

Practical

Hr/ week: 1

- Electron micrograph of a typical plant cell, nucleus, chloroplast, mitochondrion, Golgi apparatus
- Micro preparation to visualize starch grains (Potato) and raphides (Balsam / *Dracaena*)
- Preparation of onion root tip squash and identification of different stages of mitosis.
- To work out simple genetic problems in monohybrid, dihybrid, incomplete dominance, interaction of genes and lethal genes
 - a. Monohybrid - 2 problems
 - b. Dihybrid - 2 problems
 - c. Incomplete Dominance - 2 problems
 - d. Lethal genes - 2 problems
 - e. Gene interaction 9:3:3:1, 15:1 and 9:7 (each two problems)
- Submission: Record note book

Semester I			
Core II- Algae and Bryophytes			
Code: 15UBOC12	Hrs/week: 4	Hrs/Semester: 60	Credits:4

Objectives:

- To understand the major groups of lower plants and their characteristics.
- To study the effective utilization of algae and bryophytes.

- Unit I** : Classification of algae based on Fritsch (1954). General characters of Algae, Organization of thallus, Methods of reproduction-vegetative, asexual and sexual, Alternation of generation and life cycle patterns in algae.
- Unit II** : *Oscillatoria* - Occurrence, thallus structure, cell structure, movement, reproduction-vegetative and life cycle.
Volvox- Occurrence, structure of colony, cell structure, reproduction-asexual (daughter colony formation), sexual reproduction and life cycle. *Caulerpa*-occurrence, thallus structure and variations, reproduction-vegetative, sexual reproduction and life cycle.
- Unit III** : *Sargassum*- Occurrence, thallus structure, reproduction-vegetative, sexual and life cycle.
Gracilaria- Occurrence, thallus structure, reproduction-vegetative, sexual and life cycle.
 Beneficial roles of algae in agriculture, industry, medicine, food, fodder and fisheries
- Unit IV** : Classification of Bryophytes by Rothmaler (1951). General characters of Bryophytes.
Marchantia- Occurrence, thallus structure, reproduction-asexual and sexual. Structure of sporophyte, Life history (development of sex organs and sporophyte excluded).
- Unit V** : *Funaria*- Occurrence, structure of young and adult gametophyte, reproduction-vegetative and sexual. Structure of sporophyte, dehiscence of capsule. Life history (development of sex organs and sporophyte excluded).
 Economic importance of Bryophytes (direct and indirect uses).

Text Books:

1. Pandey, S.N. and P.S. Trivedi. 2006. A Text Book of Botany Vol. I and II VIKAS Publishing House Pvt. Ltd., New Delhi.
2. Sharma, O.P.2006. Text Book of Algae. Tata Mc. Graw-Hall Publications, New Delhi.

Books for Reference:

1. Fritsch, F.E. 1972. The Structure and Reproduction of Algae Vol.I all II. Cambridge Univeristy Press, London.
2. Kamat, N.D. 1982. Topics in Algae. Sai Kraipa Prakasham, Aurangabad.
3. Parihar, N.S 1967. Bryophyta. Central Book Depot Publications in Botany, Allahabad.
4. Robert Edward Lee. 2009. Phycology. Cambridge University Press.
5. Vashishta, B.R, A.K. Sinha. and V.P. Singh. 2007. Algae. S.Chand and Co., Ltd., New Delhi
6. Vashishta, B.R, A.K. Sinha. and V.P. Singh. 2006. Bryophyta. S.Chand and Co. Ltd., New Delhi.

Practical

Hr/ week: 1

- *Oscillatoria* (Slide) - filament under low power
- *Volvox* (Slide) - vegetative colony, colony with daughter colonies
- *Caulerpa* thallus organisation
- *Caulerpa* - rhizome (section)
- *Sargassum* thallus
- *Sargassum* stipe, leaf (section), male and female conceptacles (slides)
- *Gracilaria* thallus
- *Gracilaria* thallus/ thallus with cystocarp (section)
- *Marchantia* thallus
- *Marchantia* VS of Archegoniophore and VS of Sporophyte (Slide)
- *Funaria* T.S of leaf, Antheridial cluster(WM), Archegonial cluster (WM) and , L.S. of Sporophyte (slide)
- Submission: Record note book / Field visit report

SEMESTER I			
Allied I Animal Diversity			
Code: 15UZOA11	Hrs/Week: 4	Hrs/Semester: 60	Credits: 4

Objectives

- To study the salient features of invertebrates & chordates and to understand insect pests and their management.

Unit I Invertebrata

General Characters of Invertebrates

General characters of Phylum Protozoa, Porifera, Coelenterata, Platyhelminthes, Annelida, Arthropoda, Mollusca and Echinodermata

Type study : Paramecium – external characters, nutrition, osmoregulation, reproduction- binary fission and conjugation

Unit II Nematode Parasites

Nematode parasites of man – external morphology, life cycle, pathogeny, parasitic adaptations and control measures of the following:

- Ascaris lumbricoides* (round worm)
- Wuchereria bancrofti* (filarial worm)

Unit III Pests and pest control

Pests of paddy- *Leptocorisa varicornis* and *Triporeya incertulas*

Pests of coconut – *Oryctus rhinoceros* and *Rhyncophorus*

Pests of cotton - *Earias fabia* and *Platyendira gossypicillus*

Pests of sugarcane – *Pyriua perpusilla* and *Emmalocera depressella*

Control of insects - natural and artificial vectors

Unit IV Chordates

General Characters of Chordates

General characters of Phylum Chordata and classes Pisces, Amphibia, Reptilia, Aves and Mammalia.

Type study : Frog (osteology excluded)

Unit V General Topics in Chordates

Identification of poisonous snakes- poison apparatus – biting mechanism – first aid for snake bite- flight adaptations -aquatic mammals.

Text Books

1. Nair N. C, Leelavathy S, Soundara Pandian N, Murugan T. and Arumugam N. 2004, A Text Book of Invertebrates. First edition Saras Publication, Nagercoil.
2. Arumugam N. 2010 Text Book of Chordates . Revised edition Saras Publication, Nagercoil.

Books for Reference

1. Ekambaranatha Ayyer M. A Viswanathan S. Manual of Zoology 1993 Vol I Viswanathan Printers and Publishers, Chennai.
2. Ekambaranatha Ayyer M. A Viswanathan S. Manual of Zoology 1993 Vol II Viswanathan Printers and Publishers, Chennai
3. Jordon E. C.and.Varma P.S Invertebrate Zoology.2009 Revised edition. S. Chand and Company Ltd. New Delhi.
4. Prasad N. A Text Book of Invertebrate Zoology 2009 Eighth edition. Kitab Mahal Private Ltd. Allahabad.
5. Jordan E.C. and.Varma P.S.Chordate Zoology 2006,Revised edition. S. Chand and Company Ltd. New Delhi.
6. Edward E. Ruppert, Richard S. Fox and Robert D. Barnes Invertebrate Zoology, A Functional Approach 2007, Seventh edition Thompson, Brakes/cole
7. Shukla G.S.and Upadhyay V.B. Economic Zoology, 1985 First edition. Rastogi Publication, Meerut.
8. Prakash Malhotra, Economic Zoology, 2008 First edition. Adhyayan Publishers and Distributers,
9. Ravindran K. R. 2013. A Text Book of Economic Zoology. Wisdom Press, New Delhi.

PRACTICALS

Hrs / Week – 2

Cockroach : Digestive system and Nervous System

Shark : Placoid scale mounting

Frog : Virtual dissection - Demo

Slides/Models/Charts:

Paramecium entire, Silk moth (male and female), Ascaris (male and female)

Oryctes rhinoceros, star fish, bipinnaria larva, *Naja naja* poison apparatus , frog , aquatic mammals (any two) .

Identification of any two insect pests with their key characters.

SEMESTER I			
Foundation Course: Personality Development			
Code: 15UFPD11	Hrs/Week: 2	Hrs/Semester: 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 one self – 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

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

Semester II			
Core III- Fungi, Lichens and Plant pathology			
Code: 15UBOC21	Hrs/week: 4	Hrs/Semester: 60	Credits: 4

Objectives:

- To study the life cycle patterns of fungi and lichen.
- To understand fungi as pathogens and their impact

- Unit I** : Classification of fungi based on Alexopoulos and Mims (1979), General characters.
Albugo - Occurrence, somatic structure, asexual reproduction, sexual reproduction and life cycle.
Aspergillus - Occurrence, somatic structure, asexual reproduction, sexual reproduction and life cycle.
- Unit II** : *Peziza* - Occurrence, somatic structure, asexual reproduction, sexual reproduction and life cycle.
Puccinia - Occurrence, primary host, alternative host and life cycle.
Role of fungi in medicine, industry, agriculture, food and food products.
- Unit III** : Lichens- Classification, association, morphology of thallus- crustose, foliose, fruticose, reproduction and economic importance.
Usnea- Structure and reproduction.
- Unit IV** : Study of the following diseases with reference to causal organism, symptoms, dissemination and control measures: tikka disease of groundnut, red rot of sugarcane and blast disease of paddy.
- Unit V** : Study of the following diseases with reference to causal organism, symptoms, dissemination and control measures: canker disease of citrus, angular leaf spot of cotton and bunchy top of banana.

Text Books:

1. Johri, R.M., Smeh Lata, Kavitha Tyagi. 2011. A Text Book of Fungi, Dominant Publishers and Distributors Pvt. Ltd., New Delhi
2. Pandey, S.N. and P.S Trivedi 2006. A Text Book of Botany Vol. I Vikas Publishing House Pvt. Ltd., New Delhi & I.
3. Singh, V., P.C. Pandey and D.K.Jain. 2002. A Text Book of Botany, Rastogi Publication, Meerut.

Books for Reference:

1. Ahmadjian, V and M.E. Hale.1973. The lichens, Academic Press, London.
2. Alexpoulous, C.J., C.W. Mims, and M. Blackwell. 1988. Introductory Mycology, Wiley Eastern Limited, New Delhi
3. Dubey, H.C.2005. An introduction of fungi. Vikas Publishing House, New Delhi.
4. Pandey, B.P. 2007. Plant Pathology S.Chand and Co.Ltd New Delhi.
5. Rangasamy, G. 1992. Diseases of Crop Plants in India Prenties Hall of India, New Delhi.
6. Singh, R.S. 1991. Plant Diseases. Oxford IBH, New Delhi
7. Sharma, P.D. 2012. Microbiology and Plant Pathology, Third Edition, Rastogi Publications, Meerut.
8. Vashishta, B.R and A.K. Sinha. 2007. Fungi. S. S. Chand and Co Ltd. New Delhi.

Practical

Hrs/ week: 1

- Micro preparation and identification of *Albugo*, *Aspergillus*, *Peziza* and *Puccinia*.
- Morphological studies on crustose, foliose and fruiticose lichens
- Micropreparation to study *Usnea* thallus and apothecium
- Study of diseased plant materials:
 - a) Tikka disease of groundnut
 - b) Red rot of sugarcane
 - c) Blast of paddy
 - c) Canker disease of citrus.
 - e) Angular leaf spot of cotton
 - d) Bunchy top of banana
- Submission: Record note book

Semester II			
Core IV - Embryology and Anatomy			
Code: 15UBOC22	Hrs/week: 4	Hrs/Semester: 60	Credits 4

Objectives:

- To know the structure and functions of reproductive organs associated with seed development.
- To study the internal structure of Angiosperms.

Unit I : Anther-structure. anther wall and tapetum. Microsporogenesis. Pollen grain structure and pollen wall. Development of male gametophyte

Unit II : Ovule-types. Structure of orthotropous ovule. Megasporogenesis Development of female gametophyte (Polygonum type). Double fertilization, and post fertilization changes.

Unit III : Endosperm-types-nuclear, cellular, helobial and ruminant (each one example). Dicot embryo-*Capsella* type, Monocot embryo-*Luzula* type.

Unit IV : Tissues-definition and types. Meristems -classification based on position. Shoot apex (Tunica – corpus theory). Root apex (Histogen theory). Permanent tissues-simple -parenchyma, collenchyma, and sclerenchyma; Complex- xylem and phloem.

Unit V : Secondary thickening in dicot stem (*Polyalthia*, *Boerhaavia*), monocot stem (*Dracena*) and dicot root (*Azadirachta*).

Text Books:

1. Pandey, B.P. 1995. Embryology of Angiosperms S. Chand and Company Ltd. Ram Nagar, New Delhi.
2. Pandey, B.P. 2005. Plant Anatomy S. Chand and Company Ltd. Ram Nagar, New Delhi.

Books for Reference:

1. Bhojwani SS and S.P Bhatnagar. 2007. The embryology of Angiosperms. Vikas Publishing house PVT. Ltd.,
2. Eames, A.J. and L.H. Mac Danniels. 1972. An Introduction to Plant

Anatomy, Tata Mc Graw- Hill Publishing Company Ltd, New Delhi.

3. Maheswari, P. 1971. Introduction to embryology of angiosperm. Tata Mc Graw Hill publications and Co.
4. Singh, V., P.C. Pandey and D.K. Jain. 1987. Anatomy of Seed Plants, Rastogi Publication, Meerut.

Practical

Hr/ week: 1

- Observation of tissues, - parenchyma, collenchyma, chlorenchyma and sclerenchyma.
- Dissection of pollinium (*Calotropis*)
- Dissection of dicot embryo (*Tridax*)
- Sectioning – T.S. of *Datura* anther (mature stage).
- Observation of permanent slide- Anther (tetrad and pollen grain stage)
- Observation of permanent slide - Anatropous ovule.
- Models-orthotropous, amphitropous and camphyotropous ovule.
- Sectioning of dicot stem(*Polyalthia*, *Boerhaavia*), root(*Azadirachta*), monocot stem (*Dracaena*) to study the secondary growth
- Submission: Record note book

SEMESTER II			
Allied I Economic Zoology			
Code: 15UZOA21	Hrs/ Week : 4	Hrs/ Sem : 60	Credits : 4

Objectives

- To disseminate information on economic aspects of Zoology
- To inculcate knowledge on useful animal and encourage young learners to take up the small scale industries
- To generate motivation for self employment

Unit I Poultry Keeping

Introduction, choosing commercial layers- principle for construction of poultry house- types of poultry house- deep litter system- cage system- nutritive value of egg- evaluation of eggs- value of poultry manure- poultry diseases- coccidiosis, fowl pox.

Unit II Bee Keeping

Introduction, scope -species of honey bees- bee colony. modern hive- Newton's hive. Honey- composition, properties, nutritional and medicinal values- bee wax and bee venom-enemies of bees.

Unit III Dairy Farming

Introduction, scope- dairy animals – cattle – Jersey and Red Sindhi, goat - Jamuna and Malabari. Nutritive value of milk-Indian dairy products- kheer, khoa, kulfi, panir, ghee, lassi cheese, ice cream- lactometer.

Unit IV Economics of Aquaculture

Cultivable food fishes- Catla, Rohu and common carp. Shell fishes- marine prawn, edible oyster, pearl oyster-Processing and preservation- export techniques.

Unit V Vermicomposting

Introduction- types of earthworm- vermicomposting materials- preparation of worm bed- vermicomposting process- predators and parasites of earthworm- applications of vermicompost.

Text Book:

1. Jeyasurya and A. Arumugam, N. C. Nair, N. Soundara Pandian, S. Leelavathy, T. Murugan, A. Thangamani, S. Prasana Kumar, L. M. Narayanan, J. Johnson Rajeswar and R. Ramprabu 2013. Economic Zoology. First Edition Saras Publication Nagercoil

Books for Reference

1. Ravindran K. R. 2013. A Text Book of Economic Zoology, Wisdom Press, New Delhi.
2. Seethalakshmi M., and R. Shanthi 2012 Vermitechnology Saras Publication Nagercoil.
3. Shukla G. S., and V. B. Upadhyaya 1985 Economic Zoology. First Edition. Rastogi Publication
4. Shyam Kishore Singh, 2012 Dairy Farming, First Edition Alfa Publication. New Delhi

5. Jaiswal P. C. and R. R. Lokchwar 1977 .Revised Edition Handbook of Animal Husbandary,
Indian Council of Agricultural Research.
6. Everett Franklin Phillips E. F. 2010. Bee Keeping. Agrobios, India.
- 7 .Gnanamani M. R. 2002. Profitable Poultry Farming J. Hiltone Publication
- 8 .Santhanam R., N. Ramanathan and G. Jegathesan 1990. Coastal Aquaculture in India. First Edition, CBS Publishers, New Delhi.
9. Santhanam R., N.Sukumaran and P. Natarajan 1990. A Manual of Fresh water Aquaculture. Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi.

PRACTICALS

Hrs/ Week : 2

I Estimation of acidity of milk

II Honey bee : Mounting of mouth parts

Mounting of leg of worker bee

III Preparation of dairy products (any two) – Demonstration

Slides / Charts / Models

bee colony. Newton's hive, fowl pox, coccidiosis, dairy products (any two),

Lactometer,Catla, *Penaeus indicus*

Field visit and report submission

SEMESTER II			
Foundation Course: Value Education			
Code: 15UFVE21	Hrs/Week: 2	Hrs/Semester: 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.

Life Enrichment skills; Purpose for life – sensitization towards gender equality, physically challenged, intellectually challenged. Respect to age, experience,

Unit II : 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

a. Simplified physical exercise

b. Meditation – objectives, types, effect on body, mind & soul

c. Activities

i) Moralization of desires

ii) Neutralization of anger

iii) Eradication of worries

iv) 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. D. John Antony Self Psychology Counselling, Anugraha Publications
4. Prof. N.S. Raghunathan, Value Education, Margham publications, Chennai 2015
5. Marie Mignon Mascarenhas, Family Life Education Value Education, All India Association for Higher Education CREST, Bangalore, 1983

SEMESTER III			
Core V : Pteridophytes, Gymnosperms and Paleobotany			
Code: 15UBOC31	Hrs/week: 4	Hrs/Semester: 60	Credits: 4

Objectives:

- To understand the structural organization and life cycle patterns of primitive vascular plants.
- To understand the chronological events those have taken place in the history of earth.

Unit I: General characters of Pteridophytes .Outline classification of Pteridophytes by Smith (1955), Stelar evolution, heterospory and seed habit. Economic importance.

Unit II: Distribution, external structure, internal structure , reproduction, types of gametophyte and life cycle of *Lycopodium* and *Selaginella* (Developmental details not required).

Unit III: Distribution, external structure, internal structure, reproduction, types of gametophyte and life cycle of *Dicranopteris* and *Marsilea* (Developmental details not required)

Unit IV: General characters of Gymnosperms, Outline classification of Gymnosperms by Chamberlain. Distribution, external structure,internal structure , reproduction, types of gametophyte and life cycle of *Pinus* and *Gnetum*. (Developmental details not required)

Unit V: Economic importance of Gymnosperms. Fossils - introduction, process of fossilization (preservation)-theories of fossilization, types of fossils. Techniques to study fossils- Geological time scale. Fossil Pteridophytes- *Rhynia*, Fossil Gymnosperm- *Lyginopteris*-stem and ovule.

Text Book:

- 1 Pandi, S.N., P.S. Trivedi and S.P. Misra, 2006. A text Book of Botany Vol. II. Vikas Publishing House Pvt.Ltd.New Delhi.

Books for Reference:

1. Chamberlain, C.J., 1986. Gymnosperms – Structure and evolution. CBS Publishers & Distributors. Delhi.
2. Meyen, V. 1987. Fundamentals of Paleobotany. Chapman and Hall Ltd. London.
3. Rashid, A., 1985. An introduction to Pteridophyta. Vani Educational Books. Vikas Publishing House Pvt. Ltd. New Delhi.
4. Shukla, A.C., S.P. Misra, 1982. Essentials of Paleobotany. Vikas Publishing House Pvt. Ltd. New Delhi.
5. Vashishta, P.C., A.K. Sinha and Anil Kumar, 2007. Botany for degree students- Gymnosperms. S.Chand & Co., New Delhi.
6. Vashishta, P.C., A.K. Sinha and Anil Kumar, 2008. Botany for degree students – Pteridophyta. S.Chand & Co., New Delhi.

Practical

Hrs/week: 2

Pteridophytes:

- *Lycopodium* - Habit, sectioning of stem and cone
Permanent slides: stem and cone
- *Selaginella* - Habit, sectioning of rhizophore, stem and cone
Permanent slides: stem and cone
- *Dicranopteris* - Habit, sectioning of rhizome, petiole and sporophyll
Permanent slides: rhizome and petiole
- *Marsilea*- Habit, sectioning of rhizome, petiole and sporocarp
Permanent slides: petiole and sporocarp at different plane

Gymnosperms:

- *Pinus* - Twig, dwarf shoot, sectioning of stem and needle
Permanent slides: stem, young and mature male, female cone. Seed entire
- *Gnetum*- Twig, sectioning of stem and leaf, wood showing anomalous secondary thickening
Permanent slides: stem and leaf, Male and female inflorescence. Seed entire
- Fossils : *Rhynia* (Stem) , *Lyginopteris* (Stem)
- Submission: Record note book

SEMESTER III			
Part III Allied -I	CHEMISTRY FOR BIOLOGICAL SCIENCES-I		
Code: 15UCHA31	Hrs/Week : 4	Hrs/ Semester : 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 and reverse osmosis- 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-chloramine- 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 –calcination-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 colorants, non sugar sweet substances, intentional food additives — acids, bases and their salts- an 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, Textbook of Inorganic chemistry, Sultan Chand and Company, NewDelhi, Edition 2006
2. B.R. Puri, L.R. Sharma, K.C. Kalia, Principles of Inorganic Chemistry, Milestone publishers and distributers, Delhi, 2010.
3. Puri B.R, Sharma and Pathania, Elements of Physical Chemistry, Vishal publishing Co. 2013 – 2014.
4. Bagavathi Sundari K, Applied Chemistry, MJP Publishers, Tamil Nadu Book House, Chennai., 2006.
5. Siva Sankar B., Food processing and Preservation, Prentice-Hall of India Pvt. Ltd., New Delhi 2002

SEMESTER III			
Skill Based Elective 1 – Basic Computer Application			
Code: 15UBOS31	Hrs/week: 2	Hrs/semester: 30	Credits: 2

Objective:

- To impart skill in effective documentation, presentation and maintenance of scientific data
- To create skill in typing business letters and to prepare business reports
- To prepare employee pay bills
- To maintain personnel information

Unit I : Computer – characteristics, basic organization – input device, output device, storage device and CPU.

Unit II: Introduction to MS Word-opening, parts of MS Word, Working with alignment, working with indentation, working with highlight, working with font. Find and replace, formatting the paragraph, special symbols and tables, bullets and numbering, tables. Inserting clipart and word art, picture and drawing tool bar, printout, header and footer.

Unit III: Introduction to MS-excel, introduction, opening MS-excel, parts of ms excel window. Opening, saving and closing workbook, entering data in spreadsheet, editing data, copying the data, moving the data, formatting the data in MS-excel, formatting and editing the worksheet.

Unit IV: Format cells window, inserting row and column, deleting row and column, inserting worksheet, deleting worksheet, renaming worksheet, formulas in MS-excel, working with charts, types of charts, inserting charts, formatting the charts

Unit V: Introduction-opening new presentation, parts of powerpoint window, opening saving and closing presentations. Features of powerpoint, background design, word art, clip art, drawings, 3D settings. Animations, sound, views, types of views. Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show, custom show. Creating custom presentations, action setting, working with auto content wizard

Text Books

1. Vikas Gupta 2004. Comdex Computer course Kit , Dreamtech Publisher, New Delhi
2. Parteners in Learning Microsoft 2003. Technology for Education Microsoft Corporation USA

Practical

- Type a leave letter in MS Word using format/style/ modify format/text, set text to reasonably large such as 18-pt.
- Set up one table, with shading and a minimum of 3 rows and 3 columns. Record some plants name in the table.
- Create a small advertisement by inserting some pictures
- Create a document with header and footer
- Create a document having two columns with page number
- Freeze and unfreeze the rows and columns
- Insert and delete rows and columns
- Create an Excel sheet for students mark sheet of 5 subjects. Calculate the average total, pass/ fail using functions and formulas
- Create a bar chart in Excel for year wise population status
- Create a Power point presentation of your college(Minimum 10 Slides) Insert college picture Insert college name at top with bold font
- Apply transitions to all slides Apply an audio sound to all slides

SEMESTER –III			
Foundation Course: Environmental Studies			
Code: 12UEVS11	Hrs/week:2	Hrs/semester: 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., Perspectives in Environmental Studies – New Age, International Pvt. Ltd., New Delhi, 2004.
2. Odum, E.P., Fundamentals of Ecology, Natraj Publishers, New Delhi, 1996.
3. Saha, T.K. Ecology and Environmental Biology, Arunabha Sen Books & Allied Pvt. Ltd., Kolkata, 2007
4. Sharma, Environmental Biology, Rastogi Publications, Meerut, 2006.
5. Miller, Tyller g., Environmental Science, Thompeson Brooke / Cole, Singapore, 2004.
6. Vijayalakshmi, G.S. Murugesan A.G. and Sukumaran, N., Basic Environmental Science, Manonmaniam Sundaranar University Publications, Tirunelveli, 2006.

SEMESTER IV			
Core VI : Taxonomy of Angiosperms			
Code: 15UBOC41	Hrs/week: 4	Hrs/semester: 60	Credits: 4

Objectives:

- To recognize and identify the local flora and their economic value.
- To know the principles of classification and nomenclature.

Unit I : Taxonomy- definition and scope. Taxonomic hierarchy. Botanical nomenclature - vernacular names, binomial, ICBN – principles of code, principles of priority, type concept and author citation.

Unit II : Systems of classification- artificial- Linnaeus , natural - Bentham and Hooker and phylogenetic – Engler and Prantl's system - characteristics, merits and demerits. Herbarium techniques – botanical collection, pressing, preservation and role.

Unit III: Vegetative, floral characters and economic importance of: Annonaceae, Rutaceae, Caesalpiniaceae, Myrtaceae.

Unit IV: Rubiaceae, Sapotaceae, Apocynaceae, Asclepiadaceae and Acanthaceae.

Unit V: Lamiaceae, Amaranthaceae, Euphorbiaceae, Arecaceae and Poaceae.

Text Books

1. Shukla P. and S.P. Misra. 1997. An introduction to Taxonomy of angiosperms, Vikas Pub. House Ltd., New Delhi.
2. Pandey, B.P. 2005. Taxonomy of Angiosperms. S.Chand & Company LTD., New Delhi.
3. Vashista, P.C. 1985. Taxonomy of Angiosperms. Vikas Publications, New Delhi.

Books for Reference:

1. Gurcharan Singh, 2004. Plant Systematics. Oxford & IBH Publishing Co. PVT. Ltd., New Delhi.
2. Naik, V.N. 1984. Taxonomy of Angiosperms, R. Chand & Co, New Delhi.
3. Rendle, 1979. The classification of flowering plants vol. II & I. Vikas Publishing House Pvt. Ltd. Sahibabad, U.P.
4. Sharma, O.P. 1996. Plant Taxonomy. Tata MC Graw – Hill publishing Company Limited, New Delhi.
5. Singh, V. and Jain, 1997. Taxonomy of Angiosperms. Rastogi publications, New York.

Practical

Hrs/ week: 2

- Dissect out and display the floral parts of the typical members of the families prescribed in the syllabus.
- Survey of locally available plant species belonging to the families prescribed in the syllabus
- Taxonomic field trip under supervision and submission of 2 herbarium sheets and 10 photographs. Field notebook to be submitted for external evaluation.
- Study of various modifications and record of economically important products from the members of the families prescribed in the syllabus.
- Submission Record note book/ Herbarium / Field note book

SEMESTER IV			
Part III	Allied -II CHEMISTRY FOR BIOLOGICAL SCIENCES -II		
Code:15UCHA41	Hrs/Week : 4	Hrs/ Semester : 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-epimerisation- muta rotation- 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(asprin) – 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, Essentials of Physical Chemistry- S.Chand and Company Ltd., New Delhi-Revised edition-2008
2. B.R. Puri, L.R. Sharma, K.C. Kalia, Principles of Inorganic Chemistry, Milestone publishers and distributors, Delhi, 2010.
3. Puri B.R, Sharma and Pathania, Elements of Physical Chemistry,Vishal publishing Co. 2013 – 2014.
4. B.K.Sharma, Industrial Chemistry Goel Publishing House, 2003, Meerut.
5. K.S. Tewari, N.K. Vishnoi, S.N. Mehrotra. A Text Book of Organic Chemistry, 2nd Revised Editions, 1998
6. Jayashree Ghosh, Text Book of pharmaceutical chemistry 2003 S.Chand and company, New Delhi.

SEMESTER II/IV			
ALLIED CHEMISTRY PRACTICALS			
Code:15UCHAR1	Hrs/Week : 2	Hrs/ Semester : 30	Credit : 1

OBJECTIVE:

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

ORGANIC ANALYSIS:

Analysis of simple organic compounds

- Nature of the compound- Aromatic / Aliphatic
- Test for Saturation/ unsaturation.
- Characterization of functional groups (Acid, phenol (solid), aldehyde, ester, carbohydrates).

VOLUMETRIC ANALYSIS

I. Acidimetry — Alkalimetry

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

II. Permanganometry

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

III. Complexometry

- Estimation of Zinc using standard Zinc sulphate.
- Estimation of Magnesium using standard Magnesium sulphate.

Books for Reference:

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

SEMESTER IV			
Skill Based Elective II - Herbal health care products			
Code: 15UBOS41	Hrs/week: 2	Hrs/semester: 30	Credit: 2

Objective:

To give the students hands on training on preparation of herbal health care products for day to day life.

Unit I: Hair care: Botanicals for hair care (*Cocos nucifera*, *Eclipta alba*, *Acacia concinna*, *Phyllanthus emblica* and *Hibiscus rosa-sinensis* -morphology of the useful part, common name, family and uses) - Preparation of hair oil.

Unit II: Skin care: Plants used for skin care (*Phaseolus radiatus*, *Cicer arietinum*, *Curcuma aromatica*, *Curcuma zedoaria*, *Trigonella-foenum graecum*, *Citrus lemon*, *Acorus calamus* and *Rosa indica* - morphology of the useful part, common name, family and uses) -Preparation of bathing powder.

Unit III: Dental care: Herbs used for dental care (*Azadirachta indica*, *Syzygium aromaticum*, *Eucalyptus globulus*, *Mentha piperita*, *Psidium gujava* and *Allium sativum* - morphology of the useful part, common name, family and uses) - Preparation of tooth powder.

Unit IV: Eve care: Plants used for eve care (*Aegle marmelos*, *Achyranthus aspera*, *Saraca asoca*, *Asparagus racemosus* and *Boerhaavia diffusa*- morphology of the useful part, common name, family and uses) - Preparation of uterine decoction.

Unit V: Pulmonary care: Plants used for pulmonary care (*Zingiber officinalae*, *Piper nigrum*, *Piper longum*, *Cinnamomum zeylanicum*, *Abies spectapilis*, *Maranta arundinacea*, *Elettaria cardamomum* and *Saccharum officinarum* - morphology of the useful part, common name, family and uses))- Preparation of powder and pain balm.

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 and S.R. Gokhale, 2004. Pharmacognosy. Nirali Prakashan.
4. Moshrafuddin Ahmed. 2010. Medicinal Plants. MJP Publishers, Chennai.
5. Wallis, T. E. 2000. Test book of Pharmacognosy. CBS Publishers.

Practical

- Preparation of hair oil
- Preparation of bathing powder.
- Preparation of tooth powder
- Preparation of uterine decoction
- Preparation of powder for cough
- Preparation of pain balm

SEMESTER IV			
Foundation Course: Yoga and Meditation			
Code: 15UFYM31	Hrs/Week: 2	Hrs/Semester: 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 Ed I 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			
Core VII - Microbiology			
Code: 15UBOC51	Hrs/week: 6	Hrs/semester: 90	Credits: 5

Objectives:

- To make the students aware of symptoms and preventive measures of common human diseases.
- To exploit the potentialities of microorganisms in food and industries.

Unit I: Brief history and scope of microbiology. Classification of Bacteria. (Bergey's major groups). Morphology and ultra structure of Bacteria. Growth – phases of growth. Reproduction – binary fission, brief account of conjugation, transduction and transformation.

Unit II Nutrition – types- chemosynthetic, photosynthetic, saprophytic, parasitic and symbiotic. Culture of microorganisms, media for micro organisms (NA, PDA)- pure cultures, batch culture and continuous culture. Microbes and human diseases – influenza, typhoid, cholera, and tuberculosis.

Unit III Virus – general characteristics, structure and multiplication of TMV and T₄ phage. Transmission and control methods. Structure, dissemination, symptoms and control measures of HIV.

Unit IV Fermentation technology-fermentors- stirred tank, tower and air lift, commercial production of ethanol, citric acid, penicillin and vitamin B₁₂.

Unit V Food microbiology – types of food spoilage and methods of food preservation. Bacterial flora in milk, types of contamination – pasteurization of milk and milk products. Water microbiology – testing potability of water- test for coliform bacteria.

Text Book

1. Dubey, R.C. and D.K. Maheswari, 2003. A textbook of Microbiology. S. Chand company Ltd. New Delhi.

Books for Reference:

1. Adams, M.R. and M.O. Moss, 2005. Food Microbiology. New Age International publishers.
2. Kalaichelvan, P.T. 2005. Microbiology. Biotechnology - Lab Manual – MJP Publishers, Chennai.
3. Patel, A.H. 2004. Industrial Microbiology. Mac Milan India Ltd., New Delhi.
4. Pelzar, M.H., E.C.S Chan and N.R. Krieg. 2005. Microbiology. Tata MC. Graw Hill Pub. Co. Ltd., New Delhi.
5. Purohit, S.S. 1988. Microbiology. Agro Botanical publishers India.

Practical

Hrs/ week: 2

- Sterilization of glassware
- Preparation of media- NA, PDA
- Demonstration of plating and serial dilution technique
- Pure culture technique – streak plate method
- Staining of Bacteria (Gram's staining)
- Analysis of milk – dye reduction test

Spotters

- Ultra structure of bacterial cell
- T₄ phage, TMV and HIV-EM
- Colony counter
- Fermentors- stirred tank, tower and air lift,
- Agar slant/ stab/plate
- Milk samples
- Spoiled food
- Submission: Record note book

SEMESTER V			
Core VIII - Plant Physiology			
Code: 15UBOC52	Hrs/week: 6	Hrs/semester: 90	Credits: 5

Objectives:

- To understand plant functions such as photosynthesis, respiration and transpiration.
- To facilitate the study of integrated activities of plants.

Unit I Importance of water to plants. Diffusion, osmosis, imbibition, plasmolysis and water potential. Absorption of water – soil water - mechanism of water absorption. Ascent of sap – path and mechanism – vital force theory, root pressure theory and Dixon’s cohesion theory. Transpiration – types – mechanism of stomatal movement – significance.

Unit II Mineral nutrition – role, deficiency symptoms of macronutrients. Hydroponics and its application. Translocation of organic solutes – path and direction, mechanism of translocation. Nitrogen metabolism – sources of nitrogen, nitrogen fixation – symbiotic and asymbiotic – denitrification and nitrate assimilation.

Unit III Photosynthesis: photosynthetic apparatus, photosynthetic pigments, photo systems, Emerson enhancement effect. Light reaction -- photophosphorylation – cyclic and non-cyclic. CO₂ fixation cycles – C₃ and C₄. Factors affecting photosynthesis.

Unit IV Respiration: aerobic and anaerobic respiration. Mechanism of respiration – glycolysis, Krebs cycle, oxidative phosphorylation. Pentose Phosphate Pathway (PPP). Factors affecting respiration.

Unit V Growth: definition, growth phases. Plant growth hormones – occurrence, physiological effects and practical applications of Auxin, Gibberellin and Cytokinin. Photoperiodism and vernalization. Seed dormancy. Physiology of seed germination.

Text Book:

1. Jain, V.K. 2004. Fundamentals of Plant Physiology. S. Chand & Company Ltd. NewDelhi.

Books for Reference:

1. Noggle, G. R. and G. J. Fritz, 2008. Introductory Plant Physiology. Prentice Hall of India, Pvt. Ltd., New Delhi.
2. Pandey, K.K. and B.K. Sinha, 2005. Plant Physiology. Vikas publications, New Delhi.
3. Salisbury, F.B. and C.W. Ross 2007. Plant physiology. Thompson. Asia. Pvt. Ltd. Singapore.

Practical

Hrs/week: 2

- Imbibition by direct weight method
- Determination of water potential by Chardakov's method
- Measurement of rate of photosynthesis using different filters (Wilmotts bubbler)
- Rate of photosynthesis in different concentration of bi-carbonate (bubble count method)
- Extraction and separation of photosynthetic pigments by ascending paper chromatography
- Estimation of chlorophyll pigments
- Effect of temperature and solvents on membrane permeability.
- Submission: Record note book

Demonstration

- Potato osmoscope
- Tissue tension
- Suction due to transpiration
- Ganong's light screen
- Evolution of CO_2 during respiration
- Heat is evolved during respiration
- Anaerobic respiration
- Fermentation
- Study of seed dormancy
- Clinostat
- Phototropism

SEMESTER V			
Core Elective I : Biostatistics and Biological Techniques			
Code: 15UBOE51	Hrs/week: 5	Hrs/semester: 75	Credits: 5

Objectives:

- To analyse the biological data
- To acquire basic skill in instrumentation and other techniques used in biology.

Unit I: Biostatistics -scope. collection of data: types of data, methods of data collection – sampling -random sampling methods and sampling error. Classification of data and preparation of frequency distribution table (discrete and continuous series).

Unit II: Measures of central tendency: simple arithmetic mean, median and mode (direct method). Measures of dispersion: standard deviation (direct method), standard error. Chi-square test (goodness-of-fit, independence of attributes). Student t-test (comparison of means of two small samples).

Unit III: Presentation of data: Tabular (parts of table, types); diagrammatic – bar, pie diagram and pictogram; graphic – line graph, histogram, cumulative frequency curve.

Unit IV: Principle and working mechanism of simple, compound and electron microscope (TEM). Microtomy – fixation, dehydration, infiltration, embedding, sectioning and staining (safranin, fast green, haematoxylin only) mounting.

Unit V: Principle, working mechanism and applications of - pH meter, colorimeter, UV spectrophotometer, clinical centrifuge and adsorption chromatography

Text Books:

1. Gurumani N. 2005. An Introduction to Biostatistics. II Edition. M.J.P. Publishers, Chennai.
2. Gurumani N. 2006. Research Methodology for Biological Sciences. M.J.P. Publishers, Chennai.

Books for Reference:

1. Bryan C. Williams Keith Wilson, 1983. A biologists guide to practical techniques of practical biochemistry second edition. Edward Arnold publications.
2. Jayaraman J., 1985. Laboratory manual in biochemistry, Wiley Eastern Ltd., New Delhi.
3. Johansen,M., 1940. Plant Microtechnique Mc. Graw Hill.
4. Kothari C.R., 2004. Research Methodology – Methods and techniques New age International (P) Ltd., Publishers. New Delhi.
5. Palanisamy, S. and Manoharan, 1991. Statistical methods for biologists. Palani paramount publishers.
6. Plummer, D., 1987. An introduction to practical Biochemistry, Tata Mc. Graw Hill.
7. Pranab Kumar Banerjee, 2004. Introduction to Biostatistics. S. Chand & Company Ltd., New Delhi.
8. Satguru Prasad, 2003. Fundamentals of Biostatistics. 4th edition. Emkay Publications.
9. Subramanian, 2005. Biophysics principles and Techniques. MJP Publishers, Chennai.
10. Veera Bala Rastogi, 2009. Fundamentals of Biostatistics. II Edition. Ane Books Pvt. Ltd. Chennai.
11. Veerakumari, L., 2004. Biochemistry M.J.P. Publishers, Chennai.
12. Wilson, K. and J. Walker, 1997. Practical biochemistry IV edition, Cambridge university press.

SEMESTER V			
Core Elective II : Molecular Biology and Bioinformatics			
Code: 15UBOE52	Hrs/week: 5	Hrs/semester: 75	Credits:5

Objectives:

- To upgrade the knowledge about the latest concepts of prokaryotic and eukaryotic genome and expression
- To make venture into plant genomic research.

Unit I: DNA as genetic material, structure and replication of DNA- semi conservative method. Gene mutations- molecular basis. Mutagens and their mode of action.

Unit II: Structure of gene- intron, exon, muton, recon and cistron. Transcription in prokaryotes- molecular mechanism - initiation, elongation and termination. Types of RNA and their functions (brief). Translation - initiation, elongation and termination.

Unit III: Genetic code. Gene regulation in prokaryotes. Operon concept (lac). Methods of gene transfer in bacteria - conjugation, transformation and transduction

Unit IV: Bioinformatics – definition, scope. Biological databases - Nucleotide databases – EMBL, Genbank, DDBJ. Protein databases – PDB, SWISS PROT.

Unit V: DNA sequence analysis – variants of biosequences -global alignment, local alignment, gap penalty alignment, affine gap penalty alignment. Bioinformatics tools – BLAST, FASTA.

Text Books:

1. Benjamin Lewin, 2004. Genes VII. Pearson Prentice Hall.
2. Channarayappa, 2006, Molecular Biology. Principles and Principles and practices. Universities Press (India), Pvt. Ltd. 3.5.819. Hyderabad, 500 029.
3. Jin Xiong, 2006. Essential Bioinformatics Cambridge University Press.
4. Nicholl DST, 2001. An Introduction of genetic engineering. Cambridge

University press.

5. Old R.N. and Primrose, S.B. 2004. Principle of gene manipulation. Blackwell scientific publication, USA.
6. Power C. B. 2007. Genetics Vols. I and II. Himalaya publishing House. Kundanal chandak. Industrial Estate. Ghat Road. Nagpur- 440 018.
7. Rastogi, S.C., Namitta Mendriata & Parag Rastogi, 2005. Bioinformatics concepts, Skills and applications.
8. Robert H. Tamarin. 2006 Principles of Genetics. Tata Mc. Graw - Hill publishing company Ltd., New Delhi
9. Sathyanarayana, U. 2006. Biotechnology. Book and Allied (P). LTD. Kolkatha.

SEMESTER V			
Skill Based Elective – Horticulture			
Code: 15UBOS51	Hrs/week: 4	Hrs/semester: 60	Credits: 3

Objectives:

- To provide knowledge and skills in horticultural techniques.
- To make the students acquire basic skill in gardening.

Unit I: Horticulture and its importance. Division of Horticulture. Garden implements. Training, pruning, transplantation and irrigation.

Unit II : Methods of propagation - seedage; cutting –stem, leaf and root cutting, layering – simple, compound and air layering.

Unit III: Grafting – tongue, cleft and approach grafting, budding – ‘T’- budding, chip and patch budding, Vegetative propagules – bulbs, tubers, corms and rhizomes.

Unit IV: Gardening – landscaping, formal and informal gardens. Components of garden –hedges, edges, flowerbeds, arches, rockery, pergola, lawn, water garden topiary and hanging basket.

Unit V Kitchen garden –selection of site, lay out and choice of plants. Indoor gardening. Floriculture - cut flowers, flower arrangement Bonsai and terrarium.

Text Books:

1. Kumar, N.1988. Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
2. Manibhusan Rao, K.1991. Text book of horticulture, Mac Millan, India.

Books for Reference:

1. Hartmann and Kester, 1989. Plant propagation. Prentice- Hall of India Pvt.Ltd, New Delhi.
2. Randhawa, G.S.1986. Floriculture in India. Allied Publishers Pvt. Ltd. New Delhi.
3. Sadhu, M.K. 1989. Plant Propagation. Wiley Easten Ltd. New Delhi.

SEMESTER V	
Self Study Course III (Compulsory)– Pharmacognosy	
Code: 15UBOSS3	Credit: 1

- Unit I** : Definition, scope and applications of herbal medicine. Classification (morphological, therapeutic, chemical, taxonomical and chemotaxonomic classifications) and identification of drugs
- Unit II** : Drug adulteration. Methods of drug evaluation (morphological, microscopic, physical, chemical and biological).
- Unit III** : Botanical name, family, useful part, chemical constituents, adulterants and uses of the following drug.
 Glycosides – Senna, Aloe, Digitalis, Liquorice
 Terpenoids – Coriander, Fennel, Lemon, Cinnamom
 Alkaloids – Datura, Opium, Vinca, Pepper
 Lipids - Castor, Neem, Sesame oil.
- Unit IV** : Methods of collection, process and storage of medicinal plants; purification of raw drugs; factors causing drug contamination, methods of storage of drugs
- Unit V** : Cultivation- land preparation, mode of propagation, nursery raising, transplanting, manure and fertilizers, irrigation, inter culture, pest and disease, harvesting, storage, production and yield, marketing trade of *Senna*, *Aloe*, *Coleus*.

Books for Reference:

1. Anonymous. 1978. The Ayurvedic Formulary of India. Govt. of India, New Delhi
2. Anonymous. 1989. Formulary of Siddha Medicine. The Indian Medical Practitioners' Co-operative Pharmacy and Stores Ltd., Chennai
3. Anonymous. 1999. The Ayurvedic Pharmacopoeia of India. Vol. I (1 & 2). Ministry of Health and Family Welfare, Govt. India, New Delhi.
4. Chauhan, M.G. and A.P.G. Pillai. 2005. Microscopic Profile of Powdered Drugs Used in Indian Systems of Medicine. Institute of Ayurvedic Medicinal Plant Sciences, Jamnagar.
5. Daljithsimha, K. 1974. *UnaniDravyagunaDarshana*. Ayurvedic and Tibbi Academy, Lucknow
6. Jackson, B.P. and D.W. Snowdon. 1992. Atlas of Microscopy of Medicinal Plants, Culinary herbs and Spices. CBS Pub., New Delhi.

SEMESTER VI			
Core IX : Biochemistry and Biophysics			
Code: 15UBOC61	Hrs/week: 6	Hrs/semester: 90	Credits: 5

Objectives:

- To develop skill in detection and estimation of bio-molecules in plant tissues.
- To understand the structure of biomolecules and their role in plant metabolism.

- Unit I** : Isomerism, structure and properties of monosaccharides- glucose and fructose, disaccharides - sucrose and maltose, polysaccharides- cellulose and starch.
- Unit II** : Amino acids - structure, classification and properties. Proteins - primary, secondary, tertiary and quaternary structure.
- Unit III** : Lipids: saturated and unsaturated fatty acids. Classification- structure and properties of simple lipids (waxes and triglycerides), compound lipids (phospholipid and glycolipid) and derived lipids (steroids, carotenoids and terpenes).
- Unit IV** : Enzymes: classification, nomenclature based on IUB, activation energy, active site, mode of action. Vitamins - source, and deficiency symptoms of Vitamin A, B,C,D,E and K.
- Unit V** : Dual nature of light, electromagnetic spectrum – absorption spectrum, action spectrum. De- excitation - phosphorescence, fluorescence, bioluminescence. Laws of thermodynamics. Energy rich compound – ATP.

Text Book:

Jain, J.L. 2005. Fundamentals of Biochemistry. S. Chand & Co., New Delhi.

Reference Books:

1. Conn, E.J. and P.K. Stumpf. 1996. Outlines of Biochemistry, Wiley Eastern Bombay.
2. Lehninger, A.L. 1987. Biochemistry. CBS Publishers, New Delhi.
3. Philip, W. Kuchel and G.B. Ralston. 2003. Biochemistry. Tata McGraw publishing company Ltd. New Delhi.
4. Salil Bose, 1982. Elements of Biophysics. Jjothi Books, Madurai.
5. Stryer, L. 1986. Biochemistry. CBS. Publishers, New Delhi.

Practical

Hrs/Week: 2

- Titration of weak acid – acetic acid
- Preparation of buffer –acetate buffer
- Determination of complementary colour
- Verification of Beer's law.
- Estimation of starch in plant tissues by colorimetry
- Estimation of protein in plant tissues by colorimetry
- Circular paper chromatography-using dyes
- Qualitative tests: Carbohydrates-Glucose and starch, proteins and amino acids
- Submission: Record note book

SEMESTER VI			
Core X - Marine Botany			
Code: 15UBOC62	Hrs/week: 6	Hrs/semester: 90	Credits: 5

Objectives:

- To know about the marine biodiversity and its importance
- To generate self-employment by training the students in commercial cultivation of seaweeds and mass cultivation of micro-algae.

Unit I : Marine environment- classification, physical and chemical properties of sea water, characteristics and adaptations of pelagic (planktonic), benthic (littoral and deep sea) organisms.

Unit II : Marine phytoplankton- collection, preservation and importance of phytoplankton, productivity- measurement, factors affecting primary production. Role of marine bacteria in the economy of sea.

Unit III : Laboratory culture of marine micro algae. Commercial cultivation of seaweeds - general methods- *Gracilaria* and *Porphyra*. Economic importance of marine algae- in food and agriculture. Phycocolloids - agar – agar, algin, alginate, carrageenan -commercial production, properties and uses, diatomite, antibiotics and vitamins.

Unit IV : Estuarine ecology – characteristics, types. Adaptations and importance of mangroves, mangroves of Tamil Nadu. Salt marshes. Coastal sand dune vegetation and their importance.

Unit V : Marine pollution– pollution due to heavy metals, radioactive wastes, oil, thermal, algal blooms - sources and control measures – oil degrading bacteria – GMO and Pollution abatement. Conservation of coastal ecosystem with special reference to coral reef and mangroves.

Text Books:

1. Bilgrami, K.S. and L.C. Saha, 2004. Textbook of Algae. CBS publishers & Distributors, New Delhi.
2. Tait, 1978. Elements of marine ecology. Butterworth & Co. (Publishers) Ltd. London

Books for Reference:

1. Boaden P.J.S. and R. Seed 1985. An Introduction to coastal ecology. Thomas Press Limited, New Delhi.
2. Chapman, V.J. and Chapman, 1980. Seaweeds and their uses – Chapman and Hall, London.
3. Dawes, C.J. 1981. Marine Botany. John Wiley & Sons, New York.
4. Lobban, C.S. and M. J. Wynne. 1981. The biology of Seaweeds. Blackwell Scientific publications. Oxford, London.
5. Newell and Newell. 1977. Marine Plankton a practical guide. Hutchinson and Co. Ltd.
6. Sinha, P. C. 1998. Marine pollution, Anmol publications Pvt. Ltd. New Delhi.
7. Sverdrup H.U. 1972. The Oceans – Modern Asia Edition.
8. Venkataraman, G.S. 1969. The cultivation of algae, IARI.

Practical

Hrs/week: 2

1. Determination of acidity in water samples.
2. Determination of alkalinity in water samples.
3. Estimation of dissolved oxygen content in sea water samples.
4. Estimation of phosphate in seawater samples.
5. Phytoplanktons-Collection and identification
6. Seaweeds- *Ulva*, *Sargassum*, *Hypnea* and *Gracilaria*
7. Study of sand dune, salt marsh and mangrove vegetation in their natural habitat, submission of photographs and field report for internal evaluation.

SEMESTER VI			
Core XI - Plant Biotechnology			
Code: 15UBOC63	Hrs/week: 6	Hrs/semester: 90	Credits: 5

Objectives:

- To understand the wider applications of biotechnology.

Unit I : Biotechnology - definition and scope. Isolation of specific genes. from cell DNA, cDNA. Enzymes used in gene cloning - restriction endonuclease, DNA ligase. Cloning vectors- Ti plasmid- pBR 322, and cosmid, Methods of gene transfer- ultrasonicator, liposome mediated gene transfer, electroporation, particle bombardment . *Agrobacterium* mediated gene transfer in plants.

Unit II : Screening and identification of recombinants by selectable marker genes, reporter genes and colony hybridization Transgenics in crop improvement- Insect resistant plant (Bt cotton), Fungal resistant plant (tobacco), Herbicide resistance - (glyphosate tolerant plant).

Unit III : Biofertilizer - mass cultivation and application techniques of *Nostoc*. Biomass conversion- sources of wastes (Industries, agriculture, forestry, municipal sources). Biological process: enzymatic digestion, anaerobic digestion, aerobic digestion. Biogas production and its advantages.

Unit IV : Molecular farming – nutritional quality, protein, lipid and vitamins. Immunotherapeutic drugs. - edible vaccines and antibiotics. Biosafety- definition, possible dangers of GEOs, biohazards of rDNA technology, containments, Biosafety guidelines in India, Intellectual property rights.

Unit V : Tissue culture – definition and scope of plant tissue culture. Organisation of a tissue culture laboratory. Sterilization techniques , Preparation of nutrient media (MS medium), Explants - sterilization, inoculation, incubation. Callus culture – initiation, maintenance and sub culture. Anther culture, apical meristem culture.

Text Books:

1. John Jothi Prakash, E 1997. Outlines of Plant Biotechnology. JPR Publications. Vallioor.

2. Kumaresan, V 2004. Biotechnology. Saras Publication. Nagercoil.
3. Mukhopadhyay, S.N, P. Sharma, and R. Narain, 2011. A text book of DNA recombinant technology. Wisdom press. New Delhi.

Books for Reference:

1. Dubey, R.C. 2005. A textbook of Biotechnology. S. Chand & Company, New Delhi.
2. Kakralya, B.L. and I. Abuja, 2001. Transgenic Plants. Agrobios (India).
3. Mahesh, 2008 .Paddy molecular Biotechnology, New age international, publishers. (p) Limited.
4. Prema, L.P. 2006. Applied Biotechnology. MJP publishers, Chennai.
5. Sharma *et al.*, 2004. Biofertilizer technology. Abrotech Publishing academy, Udaipur.
6. Vijaya Ramesh, K. 2004. Environmental Microbiology. MJP Publishers, Chennai.
7. Singh B.D. and Singh, Biotechnology, Kalyani Publishers, New Delhi.

Practical

Hrs /week: 2

- Restriction endonuclease
- pBR322, Ti plasmid
- *Agrobacterium* mediated gene transfer
- Particle bombardment ,
- Electroporation
- Colony hybridization
- Mass cultivation of *Rhizobium*
- Mass cultivation of *Nostoc* -demonstration
- Petroleum plants
- Biogas – K VIC model
- Golden rice , Bt –cotton
- Edible vaccine
- Autoclave
- Laminar air flow chamber
- Callus culture -Demonstration
- Anther culture.-demonstration
- Meristem culture-demonstration

SEMESTER VI			
Core Elective III - Nutrition and Health			
Code: 15UBOE61	Hrs/week: 6	Hrs/semester: 90	Credits: 5

Objectives:-

- Giving the students a firm foundation in the science of nutrition
- Provide in-depth knowledge of the physiological and metabolic role of various nutrients and their interaction in human nutrition.
- Enable students to understand the basis of human nutritional requirements during the different stages of life cycle.

Unit I : Human Nutrition- major sources, functions, Recommended Dietary Allowances (RDA), Deficiency and toxicity of Carbohydrates, Protein and amino acids, Fats and other lipids

Unit II : Functions, food sources Recommended Daily Intake, effect of deficiency, over dosages of fat soluble vitamins (Vitamin -A,D,E,K), Functions, sources and effect of deficiency of water soluble vitamins(Thiamin, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, Vitamin B6,Vitamin C. Major elements - food sources, utilization, effect of deficiency and functions of major elements- calcium, phosphorous and magnesium, trace elements -Iron and iodine.

Unit III : Water fluids - body composition, functions, normal loses, water balance, food sources, requirements, problems of dehydration. Electrolytes- Sodium- function, food sources, utilization of reduction of sodium salts. Potassium- function, food sources, utilization, deficiency and related problems. Energy metabolism- measurement of food energy, calorie density. Measurement of Basal Metabolic Rate (BMR), energy for physical activity, energy for utilization of food, growth and repair, total energy requirement, energy balance.

Unit IV : Meal planning for various age groups- Adult hood-changing food habits, food selection, Nutrition during pregnancy and lactation- meeting the dietary needs of the nursing mother, modification of normal diet, factors involved in milk secretion. Nutrition during infancy- nutrient requirements, water, breast feeding , bottle feeding, supplementary foods for infants.

Unit V : Diet in obesity: Obesity- aetiology, causes and diet therapy factors leading to obesity, role of proper dieting habits, right choice of food, exercise and proper meal pattern. Nutrition in Diabetes mellitus: Symptoms and diagnosis, classification, nutritional care, control of type I and II, acute complications.

Books for Reference:

1. B. Srilakshmi. 2009. Human Nutrition. New Age International publishers.
2. B. Srilakshmi. 2011. Dietetics. New Age International publishers.
3. S.R. Mudambi and M.V.Rajagopal. 2009. Fundamentals of food, nutrition and Diet Therapy. New Age International publishers.