SEMESTER – I			
Skill Enhancement Course - I Professional English for Botany – I			
Course Code: 21UBOPE1	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

Objectives:

- To enhance the lexical, grammatical, sociolinguistic and communicative competence in an increasingly complex, interdependent world.
- To develop intellectual flexibility, creativity and critical thinking skills of students by offering adequate practice in professional context.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recognise the words used in life science and improve their competence in using the language	1	An
CO-2	Comprehend unfamiliar texts and describe biological processes	7	Ev
CO-3	Apply critical and theoretical approaches to the reading and analysis of various texts in life science	3	An
CO-4	Analyse critically, negotiate and present without committing errors and develop entrepreneurshipskills	2	Un
CO-5	Recognize the technical words used life science laboratory settings	8	Re
CO-6	learn language use in formal/professional world	7	Ap
CO-7	Write simple sentences without spelling or grammatical error	7	Ap
CO-8	Improve English proficiency with good vocabulary	7	Ap

SEMESTER – I			
Skill Enhancement Course - I Professional English for Botany – I			
Course Code: 21UBOPE1	**Hrs / Week: 2**	**Hrs / Sem: 30**	**Credits: 2**

UNIT I: Communication

1. Listening :Listening to instructions and following – Instructions to use microscope
2. Speaking: Pair Walk – Dialogue between a teacher and student about the usage of microscope (formal conversation)
3. Reading: Comprehension passage – GregorJohann Mendel
4. Writing: Developing a story with pictures – Life cycle of *Aspergillus/ Sargassum*
5. Vocabulary - Unit specific - Incorporated into the LSRW tasks

UNIT II: Description

1. Listening: Listening to process description-drawing a flow chart- How to dissect *Datura* plant/ *Musa paradisiaca*
2. Speaking- Role play- - Conversation between a Botany teacher and a student regarding the colonization of lichen
3. Reading - Skimming/Scanning – Basic equipment used in Biology experiments
4. Process Description -Compare & Contrast – Nutrition in fungi
5. Vocabulary - Unit specific - Incorporated into the LSRW tasks

UNIT III: Negotiation Strategies

1. Listening: Listening to interviews of specialist – Dr. M.S. Swaminathan (Green Revolutionist) https://www.youtube.com/watch?v=-M7QqZcY_Z4
2. Speaking: Brainstorming (Mind mapping) – Symbiotic relationship of Fungi
3. Reading: Longer reading passages for comprehension – Cell organelles
4. Writing: – Essay writing – Economic importance of Algae
5. Vocabulary - Unit specific - Incorporated into the LSRW tasks

UNIT IV: Presentation Skill

1. Listening: Listening to Lecture – General characters of Bryophyte https://www.youtube.com/watch?v=VA2LNWkZNWo
2. Speaking: Short Talks – Bryophytes are Amphibians of plant kingdom
3. Reading: Comprehension – passage - I.O.P. Iyengar
4. Writing: Recommendations - (Using laptop or PC)
5. Vocabulary - Register specific (Incorporated into the LSRW tasks)

UNIT V: Critical Thinking Skills

1. Listening: Listening Comprehension – Introduction to Horticulture
2. Speaking - Making Presentation- Etiquettes in laboratory
3. Reading-Comprehension Passages, Note making - Photosynthesis
4. Writing - Problem & Solution Essays, Creative writing–Marine Ecosystem
5. Vocabulary - Register specific (Incorporated into the LSRW tasks)

Text Books:

1. Tamil Nadu State Council for Higher Education (TANSCHE).*Professional English forLife Sciences - I.*

Books for Reference:

1. Pandey S.N. and Trivedi P.S. *A Text Book of Botany,* Vol. I and II. New Delhi: VIKASPublishing House Pvt. Ltd., 2006.
2. Sharma O.P. *Text Book of Algae*. New Delhi: Tata Mc. Graw-Hall Publications, 2006.
3. Pandey, S.N. and P.S Trivedi. *A Text Book of Botany,* Vol. I. New Delhi: VikasPublishing House Pvt. Ltd., 2006.
4. Singh V. Pandey P.C. and Jain D.K. *A Text Book of Botany*.Meerut: Rastogi Publication,2002.

SEMESTER - III			
Skill Based Elective	**Horticulture**		
Course Code: 21UBOS31	**Hrs/week: 2**	**Hrs/Semester: 30**	**Credits: 2**

Objectives:

- To provide knowledge and skills in horticultural techniques.
- To use appropriate horticultural designs based on the geographical region, microclimateand requirement there by maximize its economic and aesthetic value of the produce.
- To effectively adapt plant propagation technique in relation to their environment for income generation.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO Addressed	CL
CO-1	explain the various divisions of horticulture and importance.	1	Un
CO-2	design a landscape and interior scope project.	6	Re
CO-3	apply the concept of horticulture science to select, manage, improve plants and their production.	6	An
CO-4	demonstrate employability skills in the field of horticulture	6	Re
CO-5	equip the skill in gardening and floriculture to enhance sense of aesthetic appreciation.	6	Un
CO-6	synthesize and integrate information to solve horticultural problems.	5	Cr
CO-7	apply horticultural principles to the successful growth and production of horticultural plants.	3	An
CO-8	communicate effectively within the discipline and also be able to transmit knowledge and skills to lay- persons in the general public.	6	Ap

SEMESTER - III			
Skill Based Elective	**Horticulture**		
Course Code: 21UBOS31	**Hrs/week: 2**	**Hrs/Semester: 30**	**Credit: 2**

UNIT I: Horticulture : scope and its importance, divisions of horticulture. Garden implements: spade, pick axe, tiller, digging fork, pruning scissors, budding knife, grafting knife, sprayer, water can, making plant growing structure using waste material, pot mixture making.

UNIT II: Methods of propagation - Cutting: leaf cutting, stem cutting: herbaceous stem cutting, soft wood cutting, semi-hard wood cutting, hard wood cutting, root cutting. layering; simple layering, compound layering, air layering, mound layering, tip layering and trench layering.

UNIT III: Grafting: Approach grafting, side grafting, splice grafting, saddle grafting, flat grafting, cleft grafting. budding: 'T' budding, chip, patch budding, vegetative propagules: bulbs, tubers, rhizomes.

UNIT IV: Kitchen garden: selection of site, lay out and choice of plants, designing kitchen garden using Grow Veg software. Storage and preservation of fruits and vegetables.

UNIT V: Gardening: Purpose, plant choice and caring, Design and establishment of hanging basket, rockery, bonsai, flower beds, terrarium Floriculture: cut flowers, flower arrangement: types of flower arrangement-western style, eastern style, components of flower arrangement, arranging the flower in the container.

Text Book:

1. Kumar, N. *Introduction to Horticulture*. India: Rajalakshmi Publications.1997.

Books for Reference:

1. Choudhri D and Amal Metha. D. *Flower crops cultivation and management.* Jaipur:Oxford book company, 2010.
2. Andrew, F.S. and Halfacre, R.G. *Fundamentals of Horticulture.* New Delhi:Tata Mc.GrawHill, 1977.
3. Hartmann & Kester. *Plant propagation Prentice*. New Delhi: Hall India Pvt. Ltd., 1989,
4. Mallikarjuna Reddy and Aparna Rao. *Plant propagation*

*in horticulture.*NewDelhi:Pacific book international, 2010.
5. Randahawa, G.S. *Floriculture in India.* Mumbai:Allied publishers, 1985.
6. Utpal Banerji. *Horticulture.* Jaipur:Mangal Deep Publication, 2008.

SEMESTER III			
Skill Based Elective	**Gardening and Nursery Management**		
Course Code:21UBOS32	**Hrs/week:2**	**Hrs/Semester:30**	**Credit:2**

Objectives:

- To supply elite planting material of the highest possible quality forest abolishment of neworchards.
- To grow plants in an open environment, maintain a good quality of plants and protect the plants from pests and diseases.
- To create awareness about kitchen gardening, to improve skills for growing fresh and safe vegetables without use of any pesticide.

Course Outcomes:

CO. No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	recollect scope and basic concepts of gardening	1	Re
CO-2	Understand the different types of gardens and suggest plant choices	2	Un
CO-3	Importance, features and maintenance of commercial gardening.	7	An
CO-4	Acquire knowledge regarding theory and practice of cultural and production techniques and methods.	4	An
CO-5	Equip the skill in landscaping, gardening and floriculture and enhance sense of beautification and aesthetic values	4	Cr
CO-6	Understand the importance, types and establishment of Nursery	5	Un
CO-7	Learn practices like nutrition, water management and pest management	5	Un
CO-8	Develop skills necessary to manage a wholesale nursery	8	Cr

SEMESTER III			
Skill Based Elective	**Gardening and Nursery Management**		
CourseCode:21UBOS32	**Hrs/week:2**	**Hrs/Semester:30**	**Credit:2**

UNIT I: Scope and introduction to gardening. Different types of garden and their suitability.Gardening features, importance of garden and suitable plants for different types of garden. Designing a plan for a commercial garden.

UNIT II: Home garden – suitable plants for home gardening. Detailed aspects ofroof garden, terrace garden and vertical garden. Advantages and limitations of roof, terrace and vertical garden. Plants suitable for different types of gardening. Importance, features and maintenance of commercial gardening.

UNIT III: Different shade loving perennials and flowering trees for commercial/ornamental gardening. Detailed description of potted plants such as outdoor, foliage, flowers, creepers, climbers etc., Introduction to bonsai training, pruning and wiring. Introduction on terrarium technique.

UNIT IV: Introduction, importance, development. Establishment of nursery: Selection ofsite - location, soil and climate for nursery, topography, wind, elevation of nursery place, irrigation and drainage facilities, insects pest and diseases control in nursery. Types ofNursery: multipurpose or mixed nurseries, mono purpose or general nursery, specialized nursery,attached or auxiliary or subsidiary nursery.

UNIT V: Location of nursery: Scientific layout of nursery, collection of mother plantand their management, source of available root stocks and their proper utilization. Use of standardmethods of plant propagation, proper management of seed, arrangement of good selling, propertesting facilities, arrangement of training and demonstration, arrangement of nursery exhibitions.

Text Books:

1. Kumar, N. *Introduction to Horticulture*. Nagercoil,India.Rajalakshmi Publications, 1997.
2. YashwantraoChavanNewDelhi.MaharashtraOpenUniversity,Resource Book on HorticultureNursery Management,ICAR.

Book for Reference:

1. Utpal Banerji. *Horticulture* Jaipur:Mangal Deep Publication, 2008.
2. EdmundSenn-Andrew– Halfacre.*FundamentalsofHorticulture.*TataMc.GrawHill,1977.
3. Randahawa *Floriculture in India.* Alliedpublishers,1985.
4. Mallikarjuna Reddy and Aparna rao *Plant propagation in horticulture.* New Delhi:Pacific book international, 2010.

SEMESTER - I			
Core I	**Cell Biology and Genetics**		
Code: 18UBOC11	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Vision:

To understand the basic cellular components and principles of their functions.

Mission:

To understand the structure and chemical organization of sub cellular components of the plant cell.

To understand the classicl Mendelian theory on heredity and alterative pattern of gene expression.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	understand the structure and function of basic organelles of plant cells	1	Un
CO-2	describe the structural organization and transport function of the plasma membrane	2	Un
CO-3	identify the non living inclusions and their significance	4	Re
CO-4	reveal morphogenetic events through mitosis and meiosis	2	Re
CO-5	understand theories of heredity through Mendel's hybridization experiment	2,4	Un,Cr
CO-6	draw checker boards and predict the outcome of offspring of hybridization	8	Ap
CO-7	infer inter allelic and inter genic interaction in determination of specific characters including blood groupings in man	4	Re,Un
CO-8	comprehend the polygenic inheritance and mechanism of sex determination in plants	4	An

SEMESTER – I			
Core I	**Cell Biology and Genetics**		
Code: 18UBOC11	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Unit I : Ultra structure of the plant cell, 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 and aleurone. 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 Books:

1. John Jothi Prakash, E. 2010. *Principles of Genetics and genetic engineering.* Emkay Publications, Delhi.
2. Verma, P.S. and V.K. Agarwal. 2007, *Cell biology, Genetics, Molecular Biology, Evolution and Ecology*, S.Chand and Co., New 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.

PRACTICALS

Hrs / Week – 2 **Credit: 1**

1. Electron micrograph of a typical plant cell, nucleus, chloroplast, mitochondrion, Golgi apparatus
2. Micro preparation to visualize starch grains (Potato) and raphides (Balsam / *Dracaena*), cystolith, aleurone

SEMESTER – I			
Core II	**Algae and Bryophytes**		
Code:18UBOC12	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Vision:

To have comprehensive idea on primitive plants.

Mission:

To understand the major groups of lower plants and their characteristics.

To study the effective utilization of algae and bryophytes for environment and human well being

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	find out the general characteristics of Algae and Bryophytes and structure of them.	1	An
CO-2	evaluate the importance of algae and Bryophytes and their role in everyday life and environment.	7	Ev
CO-3	distinguish mosses and thallose liverworts	3	An
CO-4	compare and contrast different classes of algae and bryophytes	2	Un
CO-5	identify Algae and Bryophytes samples collected from the field	8	Re
CO-6	distinguish life cycle pattern in different groups of Algae and Bryophytes	7	Ap
CO-7	understand the criteria behind the classification of Algae and Bryophytes	1	Un
CO-8	apply the knowledge for self employability	6	Ap

SEMESTER – I			
Core II	**Algae and Bryophytes**		
Code:18UBOC12	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

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 : Occurrence, thallus structure, reproduction-vegetative, sexual and life cycle of *Sargassum* and *Gracilaria*.
Beneficial roles of algae in agriculture, industry, medicine, food, fodder and

Fisheries

Unit IV : Classification of Bryophytes by Rothmaler (1951). General characteristics 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.

SEMESTER - II			
Core III	**Fungi, Lichens and Plant pathology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Sem : 60**	**Credits: 4**

Vision:

Imbibe knowledge on uniqueness of Fungi and Lichens

Mission:

To study the life cycle patterns of fungi and lichen.

To learn about the plant diseases and their impact on crops

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	characterize and identify the diversity of fungal and lichen world and their adaptations	1	Un
CO-2	Identify fungal specimens microscopically	2	Ap
CO-3	Identify major groups of fungi and lichens based on morphology and anatomy	2	Ap
CO-4	understand and explain the ecological roles and trophic modes of major Fungal and Lichen groups	5	Ap
CO-5	evaluate the importance of Fungi and Lichens , their role in everyday life and environment	7	Ev
CO-6	understand the various plant diseases and their impact on agriculture	7	Un
CO-7	identify symptoms and diagnose different plant diseases and methods to control.	6	Ap
CO-8	identify pathogenecity with their specific symptoms	4	Ev

SEMESTER - II			
Core III	**Fungi, Lichens and Plant pathology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit I : Classification of fungi based on Alexopoulus and Mims (1979), General characters.
Occurrence, somatic structure, asexual reproduction, sexual reproduction and life cycle of *Albugo* and *Aspergillus*.

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, fruiticose, 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

SEMESTER - II			
Core IV	**Anatomy and Embryology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Sem: 60**	**Credits: 4**

Vision:

To understand the fundamental organization of tissues and developmental events of plants

Mission:

To understand the developmental process from flower to fruit

To gain knowledge on the histological architecture of plants

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	C L
CO-1	classify meristems and explain the organization of root apex	2	Ev ,An
CO-2	distinguish meristematic and permanent tissues	8	An
CO-3	compare the secondary growth in dicot stem and root(normal and anomalous)	3 , 7	An
CO-4	describe the structure of a microsporangium and pollengrains and	1 ,3	Un , E
CO-5	Explain the structure and development of male gametophyte.	1	Un
CO-6	explain the structure and development of megasporangium	2 , 3	Ev
CO-7	understand fertilization and double fertilization.	2	Un
CO-8	differentiate dicot embryo from monocot embryo.	2 ,3	An

SEMESTER - II			
Core IV	**Anatomy and Embryology**		
Code:18UBOC21	**Hrs / Week: 4**	**Hrs / Sem : 60**	**Credits: 4**

Unit I : 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 II : Normal secondary thickening in dicot stem (*Polyalthia*) and root (*Azadirachta*). Anomalous secondary thickening in dicot stem (*Boerhaavia)* and monocot stem (*Dracena*)

Unit III : Anther – structure, anther wall, tapetum. Microsporogenesis. Pollen grain structure and pollen wall development. Pollinium. Development of male gametophyte

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

Unit V : Endosperm-types (nuclear, cellular and helobial -each one example) and haustorial behavior of endosperm. Dicot embryo-*Capsella* type, Monocot embryo *Luzula* type.

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.

PRACTICALS

Hrs/ Week : 2

1. Verification of Mendel's monohybrid cross using beads
2. ABO blood grouping - Demonstration
3. Qualitative tests for glucose, protein and lipid
4. Effect of temperature on the opercular movement of fish ; Calculation of Q_{10}
5. Examination of excretory products (ammonia, urea and uric acid crystals)
6. Museum specimens : Slides / Charts / Models

   Sex linked inheritance of colour blindness, haemophilia, Down syndrome. Frog - sperm and egg, diffuse placenta (pig), cotyledonary placenta (sheep). Villus, nephron, neuron, human sperm and human egg

Books for Reference

Jeyasurya, Dulsy Fatima, Kumaresan and Selvaraj 2013.*Practical Zoology Volume* –3, Saras Publication, Nagercoil

SEMESTER – III			
Core V	**Pteridophytes, Gymnosperms and Paleobotany**		
Code: 18UBOC31	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Vision:

- To learn the diversity, structural organization and reproduction of Pteridophytes and Gymnosperms

Mission:

- To study the forms prescribed in the syllabus under natural condition.
- To understand the chronological events those have taken place in the history of earth.

Course Outcome

CO.No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	summarize the general characters of Pteridophytes and Gymnosperms	1	Cr
CO-2	critically analyse the affinities and differences between Pteridophytes and Gymnosperms and relate them to understand the evolutionary trends	1	Re
CO-3	outline and recall the classification of Gymnosperms and appraise the economic importance of Pteridophytes and Gymnosperms	3	Ev
CO-4	understand the different stages in the life cycle of Pteridophytes and Gymnosperms	2	Un
CO-5	identify the types of fossils and discuss the fossilization process.	2	An
CO-6	relate the geological era with evolution of plants	2	Un
CO-7	learn about some of the fossils of pteridophytes and Gymnosperms	2	Un
CO-8	justify and analyze the evolution of seed plants from pteidophytes	2	Ev

Semester III			
NME I	**Plant Resource Utilization**		
Code: 18UBON31	**Hrs/week:2**	**Hrs/Semester: 30**	**Credit: 2**

Vision

- To appreciate the relevance of crop plants to the economy of the people

Mission

- To know the commercial value of plants resources
- To study the morphology and uses of plants in our day today life

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	acquire knowledge of useful plant parts	3	Re
CO-2	to acquire the knowledge on geographical area of cultivation, production and marketing varriable food crops and their finished goods	1	Un
CO-3	able to differentiate importance of tropical and temperate fruits for human well being	3	Ap
CO-4	able to access the value of spices, contiments and beverage crops in international trads and confectionery industries	3	Ev
CO-5	understand the wealth of cash crops in India and their importance in improving trade and industrial growth	3	Ev
CO-6	comment on fibres as an alternative source of plastics	5	Un
CO-7	explain the use of beverages and their production	6	Un
CO-8	able to learn about the cultivation practices and extraction of oil from oil crops	6	Cr

Semester III			
NME I	**Plant Resource Utilization**		
Code: 18UBON31	**Hrs/week:2**	**Hrs/Semester: 30**	**Credit: 2**

Unit I : Botanical description, distribution, cultivation, production, harvesting and marketing of Cereals and millets - Rice, Wheat, Maize, Oat, Pearl millet, Italian millet, Finger millet

Unit II : Botanical description, distribution, cultivation, production, harvesting and marketing of Legumes: Soyabean, black gram, green gram and Bengal gram
Vegetables: Stem – Potato, garlic, Herbage – Cabbage, Cauliflower, Fruit - Tomato, Brinjal

Unit III : Botanical description, distribution, cultivation, production, harvesting and marketing of Fruits: Tropical fruits – Mango, banana, guava and papaya, Temperate fruits– Apple and grape

Unit IV : Botanical description, distribution, cultivation, production, harvesting and marketing of Spices and Condiments: Roots – Asafoetida, stem – ginger, bark – cinnamon, leaf – curry leaves, flower bud –clove, fruit – capsicum, coriander and black pepper.

Unit V : Beverages : Botanical description, distribution, cultivation, production, harvesting processing and marketing of tea and wine preparation from fruits; Oil –groundnut, coconut and Eucalyptus oil, extraction techniques of oil

Text book:

1. Pandey B. P. 1999. Economic Botany, S. CHAND

Books for Reference:

1. Chrispeels M.J. and Sandava. D. 1977. *Plants, Food and People*. San Fancisco.W.H. Preeman &Co.
2. Kocchar S L. 1998. *Economic Botany of the Tropics*. II Edn. Mac Millan India Ltd.
3. Sammbamurty A.V.S.S., Subrahmanyam N.S. 2008. *A text book of Modern Economic Botany* CBS publisher
4. Sharma O. P. 1996. *Hills Economic Botany*, Tata McGraw Hill. Co. Ltd. New Delhi
5. Sunidhi Miglani, 2016. *Text Book of Economic Botany*, ABS Books. Delhi
6. Swaminathan M and Kochar S. L. 1989. *Plants and Society*, Macmillar Publisher. Ltd.
7. Wickens G E 2004. *Economic Botany.* Principles and Practices, Springer, Kluer Publishers. Dordecht The Netherlands.

SEMESTER IV			
NME II	**Food Technology**		
Code: 18UBON41	**Hrs/week:2**	**Hrs/Semester:30**	**Credit: 2**

Vision

- To offer professional edge by providing hands on training

Mission

- To familiarize the students about the food processing techniques
- To understand the food preservation methods and techniques adopted.

Course Outcome

CO.No.	Upon completion of this programme, students will be able to	PSO addressed	CL
CO-1	discuss basic principles of common food preservation methods.	6,8	Un
CO-2	identify and explain nutrients in foods and the specific functions in maintaining health.	6,8	Re
CO-3	recognize the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage.	6,8	An
CO-4	manufacture a range of simple food products	6,8	Ap
CO-5	modify recipe for specific purposes such as nutrient enhancement, quality improvement and ingredient substitution.	4	Ap
CO-6	understand the compositional and technological aspects of milk and fish	6,8	Un
CO-7	bakery technology and quality aspects of bakery products	6,8	
CO-8	apply preservation principles in product design	6	Ap

SEMESTER IV			
NME II	**Food Technology**		
Code: 18UBON41	**Hrs/week:2**	**Hrs/Semester:30**	**Credit: 2**

Unit I : **Technology of Vegetables:** Nutritive value of vegetable, storage of vegetable, factors affecting storage life, spoilage of vegetables. **Methods of preservation** : refrigeration, freezing, canning, drying and dehydration, and chemical preservatives. Preparation of pickles and ready to eat vegetable products

Unit II : **Bakery Technology:** Ingredients & processes for breads, cakes, Equipments used, product quality characteristics, faults and corrective measures. Different types of icings.

Unit III : **Dairy Technology:** Milk and dairy products; Pasteurization, sterilization, HTST and UHT processes. Preparation of butter, ghee, ice-cream, paneer.

Unit IV : **Technology of Fruits:** fruit composition and nutritive value of fruits. Spoilage of fruits. Preparation of jam - mixed fruits jam. Fruit juices – pineapple and grapes. Squash –lemon. Sauce- tomato.

Unit V : **Technology of Fish**: Average composition of fish; storage of raw fish; Freshness criteria and quality assessment of fish; Spoilage of fish; **Methods of Preservation of fish:** Canning, Freezing, Drying, Salting, smoking, curing, fermentation. Preparation of fish sauce and fish pickle.

Text Book:

1. Raina, U., Kashyap, S., Narula, V., Thomas, S.,Suvira, Vir S. and Chopra, S. 2007 Basic Food Preparation-A complete Manual. 3rd Ed. Orient Longman Pvt. Ltd. Hyderabad.

Books for Reference:

1. Dubey, S.C. 2007. *Basic Baking 5th Ed*. Chanakya Mudrak Pvt. Ltd. New Delhi
2. Frazier, W.C and West Holf, D.C. 1995. *Food Microbiology*. Tata McGraw Hill publishing Co Ltd., New Delhi.
3. Kulshrestha, S.K. 1994. *Food preservation.* Vikas publishing House, New Delhi.
4. Srivastava,R. P. 1982. *Preservation of fruits and vegetable products***.** Bishen Singh Mahendra Pal Singh, Dehra Dun.
5. Srivastava,R. P. and Kumar, S. 2002. *Fruit and Vegetable Preservation : Principles and Practices.* International Book Distributing Co. Lucknow, India
6. Swaminathan, M., 1992. *Handbook of Food Science and Experimental foods*. The Banglore printing and publishing Co Ltd., Banglore.

Semester III			
Core Skilled Based – Horticulture and Plant breeding			
Code:18UBOS31	**Hrs/week:4**	**Hrs/Semester : 60**	**Credit : 4**

Unit I : Horticulture – definition, divisions and importance. Propagation of horticultural crops – cuttage, layerage, graftage and budding. Seedage – characteristics of good seed, and seed treatment for germination – Transplanting of seedling.

Unit II : Plant growing structures – objectives and types – green houses, hot beds, cold frames and conservatory. Establishment and cultivation of orchard. Gardening - outdoor garden –types, principles, designing and garden components.

Unit III : Indoor gardening. Terrarium, hanging basket and bonsai. Commercial gardening - cut flowers and economic flowers. Kitchen gardening – selection of site, lay out and choice of plants. Storage and preservation of fruits and vegetables.

Unit IV : Plant breeding:. Nature and scope of plant breeding; Defining - objectives of crop improvement -high yielding variety-disease resistant crops.hybridization techniques - emasculation - bagging. crossing.labellingand harvesting of hybrid seeds and raising F1 generation. Methods of Breeding self pollinated, cross pollinated and asexually propagsted crops, pure line and mass selection.

Unit V : Development of hybrid cultivars - Evalution of combining ability, prediction of double cross hybrid performance, production of hybrid through the use of cytoplasmic-genetic male-sterility system. Breeding for pest resistance: specific resistance vs general resistance, mechanism of resistance, tolerance, use and development of resistance gene.

Text Book :

1. Kumar, N. 1997. Introduction to Horticulture. Rajalakshmi Publications, Nagercoil, India.

Books for Reference:

1. AllardJohn R. W., *Principles of plant breeding* Wiley & Sons, Inc.New York.
2. Choudhri D and Amal Metha 2010. *Flower crops cultivation and management* Oxford book company . Jaipur
3. *Cytology and Evolution* E.N.Willmer.Academic press New York and London.
4. Edmund Senn - Andrew – Halfacre. 1977. *Fundamentals of Horticulture.* Tata Mc. Graw Hill.

5. Evolution Jay M. Savage. Amerind Publishing Co. Pvt.Ltd.
6. Hartmann & Kester, 1989 – *Plant propagation. Prentice* – Hall of India Pvt. Ltd. New Delhi.
7. Kumar, N. 1997. *Introduction to Horticulture*. Rajalakshmi Publications, Nagercoil, India.
8. Mallikarjuna Reddy and Aparna rao 2010. *Plant propagation in horticulture.* Pacific book international. New Delhi.
9. *Plant Breeding Theory and Practice.* V.L.Chopra. Oxford and IBH Publishing Co. Pvt.Ltd. New Delhi.
10. Randahawa 1985. *Floriculture in India.* Allied publishers.
11. Sharma, J. R., *Principles and practice of plant breeding* TataMcGraw-Hill Publishing Company Limited New Delhi.
12. Utpal Banerji 2008. *Horticulture* Mangal Deep Publication. Jaipur

SEMESTER –V			
Common Skill Based	**Core :Computer for Digital Era and Soft Skills**		
CourseCode:18UCSB51	**Hrs/Week:2**	**Hrs/Semester:30**	**Credits:2**

Objectives:

- To provide basic knowledge of digital computers.
- To create awareness of e-learning and security issues.
- To develop self-confidence by mastering interpersonal skills, team management skills and leadership skills.

Course Outcome:

CO.No.	Upon completion of this course, students will be able to	PSO's addressed	CL
CO-1	understand the different types of computer, software and its impact.	2	Re
CO-2	enhance and develop the IOT applications.	2	Re
CO-3	be aware of social medias and social networking.	2	Re
CO-4	impart soft skills for the professional progress.	2	Re
CO-5	appreciate self and team building for effective career.	4	An

SEMESTER –V			
Common Skill Based Core	**Computer for Digital Era and Soft Skills**		
CourseCode:18UCSB51	**Hrs/ Week:2**	**Hrs/Semester:30**	**Credits:2**

Unit I: Fundamentals of Computers:

Introduction to computers- Components of computers-Working principle - Types of computers-Tablet-Notebook-Smart phone-PDA-Impact of computers on society-Types of software.

Unit II: Recent Trends in Computer Science and E-Commerce :

IoT - applications-Mobile applications - E-Learning - E-Commerce - digital payments.

Unit III: Social Media:

Facebook-Twitter-Linked In-Instagram-Advantages of Social Networking-Issues/Risks of SocialNetworking-Protecting ourselves from social Networking problems - Cybercrimes - Hacking -Phishing-Cyber Security

Unit IV: Introduction to Soft Skills:

Learning objectives – What are soft skills?-Categories of Soft Skills-Integral Parts of Soft Skills.

Unit V: Understanding Self and Team Building:

Introduction- Transactional Analysis (TA) -Structural analysis of Ego states- The functional model of Ego states - Egogram-Strokes – Life Position - Egogram and Life Positions Questionnaire-Team and Team Building- Features of effective creative teams.

Books for Reference:

1. Peter Norton, Introduction to Computers 6th Edition
2. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing, I Edition, Pearson Education, 2003.
3. E.Balagurusamy ,Fundamentals of Computers ,McGraw Hill
4. Henry Chan, Raymond Lee ,Tharam Dillon, Elizabeth Chang ,E-Commerce fundamentals and applications ,Wiley Student edition
5. Benita Bhatia Dua, Deepa Jeyaraman ,Profit with Social Media ,CNBC
6. Dr.K.Alex, Soft Skills ,S.Chand& Co.

E-Learning Resources:

7. http://www.digitalindia.gov.in/content/social-media-analytics
8. https://www.researchgate.net/publication/307878962_Introduction_to_E-Governance
9. http://www.ijqr.net/journal/v10
10.https://www.researchgate.net/publication/258339295_FUNDAMENTALS_OF_COMPUTER STUDIES

Semester V			
Core IX	**Biochemistry**		
Code: 18UBOC53	**Hrs/week: 5**	**Hrs/ Semester: 75**	**Credit: 4**

Vision:

- To familiarize with the biomolecules and their role in vital activities of plants

Mission:

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

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the types of chemical bonds involved in the structure of biomolecules and basic concepts of acid, base and buffer	2	Un
CO-2	classify carbohydrates of different domain based on their physical and chemical organization	2	An
CO-3	understand the structure and properties of amino acids	2	Un
CO-4	describe the structural details and properties of protein	2	Un
CO-5	explain the nomenclature, mechanism of enzyme activity	2,4	Un
CO-6	discuss the sources of vitamins and symptoms specific to vitamin deficiency in human begins.	4	Re
CO-7	categorize lipids based on their structure	2	Un
CO-8	acquire skill in qualitative and quantitative estimation of the biomolecules	6	Ap

Semester V			
Core IX	**Biochemistry**		
Code: 18UBOC53	**Hrs/week: 5**	**Hrs/ Semester: 75**	**Credit: 4**

Unit I : **Biomolecules:** Introduction. **Chemical Bonds:** Covalent bond, non - covalent bond, Ionic bond, Van der Waals forces, hydrogen bond. **pH:** Acid – base concept, Henderson-Hasselbach equation. **Buffers:** Biological buffer Systems in body fluids

Unit II : **Carbohydrates:** Definition, classification and functions. **Monosaccharides:** structure and properties, chirality and optical activity, stereoisomerism, absolute and relative configuration (D & L and R & S), open and cyclic structure of glucose and fructose (pyranose and furanose). **Disaccharides:** structure and properties - reducing sugar (maltose), non-reducing sugar (sucrose). **Polysaccharides:** structure and properties – Homopolysaccharide: structural polysaccharide (cellulose), storage polysaccharide (starch).

Unit III : **Amino acids:** Structure, classification (based on composition and polarity of R group), physical properties and chemical reactions of amino acids. **Proteins**: peptide bond, Psi and Phi angle, Ramachandran plot. **Structural organization of proteins**: primary, secondary, tertiary and quaternary structure. Properties of protein

Unit IV : **Enzymes:** Structure of enzyme: holoenzyme, apoenzyme, prosthetic group (cofactors, coenzymes). Classification and nomenclature of enzymes. Mechanism of action (activation energy, lock and key hypothesis, induced fit theory). Factors affecting enzyme activity. **Vitamins:** source and deficiency symptoms of vitamin A, B,C,D,E and K.

Unit V : **Lipids:** Structure, classification: simple lipids (waxes and triglycerides), compound lipids (phospholipid and glycolipid) and derived lipids (steroids, carotenoids and terpenes). Properties of lipids.

Text Book:

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

Books for Reference:

1. Conn, E.J. and P.K. Stumpf. 1996. Outlines of Biochemistry, Wiley Eastern Ltd., Bombay.
2. Lehninger, A.L. 1987. Biochemistry. CBS Publishers, New Delhi.

3. Philip, W., Kuchel and G.B. Ralston. 2003. Biochemistry. Tata McGraw – Hillpublishing company Ltd. New Delhi.
4. Salil Bose. 1982. Elements of Biophysics. Jjothi Books, Madurai.
5. Stryer, L. 1986. Biochemistry.CBS. Publishers, New Delhi.

Practicals Hrs per week: 2

- Titration of weak acid
- Preparation of acetate buffer
- Estimation of starch in plant tissues by colorimetry
- Estimation of soluble sugar in plant tissues by colorimetry
- Separation of amino acids from a mixture by paper chromatography
- Estimation of protein in plant tissues by colorimetry
- Estimation of ascorbic acid
- Determinaion of saponification number
- Estimation of carotenoids
- Qualitative tests: Carbohydrates-Glucose and starch, proteins and amino acids

Submission: Record note book

Book for Reference:

1. Jayaraman. J. 2001. Laboratory manual in Biochemistry. New Age Internationalpublisher, New Delhi.

SEMESTER - V			
Core Integral I	**Biostatistics and Biological Techniques**		
Code: 18UBOI51	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Vision:

- To understand the basic statistical principles and techniques used in biology.

Mission:

- To introduce the common statistical techniques and terminology.
- To familiarize the students with different instruments to carry out basic research.

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the fundamentals of statistical analysis	4	Un
CO-2	apply the learned procedure for collecting data, presenting data and analyze the same.	6	An
CO-3	able to interpret the results and find solution to the problems.	8	Ev
CO-4	understand the principles, working methodology and applications of instruments used in biology	4	Cr
CO-5	apply micro techniques for permanent mounting of biological samples.	8	Cr
CO-6	apply the learned techniques to carry out basic research in biology.	4	Ap
CO-7	understand the importance of data collection and their organization	8	Un
CO-8	communicate the results of statistical analyses accurately and effectively	8	Ev

SEMESTER - V			
Core Integral I	**Biostatistics and Biological Techniques**		
Code:18UBOI51	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit I: Introduction and scope of biostatistics. types of data – primary and secondary, Collection of data, sampling - random sampling methods and sampling error. Classification of data, preparation of frequency distribution table (discrete and continuous series).

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

Unit III: 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 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, spectrophotometry – colorimeter and UV spectrophotometer. Separation techniques – clinical centrifuge, electrophorosis and adsorptionchromatography.

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. GrawHill.
7. Pranab Kumar Banerjee, 2004. *Introduction to Biostatistics*. S. Chand &Company Ltd., New Delhi.
8. Satguru Prasad, 2003. *Fundamentals of Biostatistics*. 4th edition. EmkayPublications.
9. Subramanian, 2005. *Biophysics principles and Techniques.* MJP Publishers,Chennai.
10. Veera Bala Rastogi, 2009. *Fundamentals of Biostatistics*. II Edition. Ane BooksPvt. Ltd. Chennai.
11. Veerakumari, L., 2004. *Biochemistry* M.J.P. Publishers, Chennai.
12. Wilson, K. and J. Walker, 1997. *Practical biochemistry IV edition*, Cambridgeuniversity press.

Semester - V			
Common Skill Based Core	**Computer for Digital Era and Soft Skills**		
Code : 21UCSB51	**Hrs / Week : 2**	**Hrs / Sem : 30**	**Credits : 2**

Course Outcome

- Identify different types of computer systems.
- Classify various types of software being used.
- Compare various digital payments and use them in day to day life.
- Recognise the innovative technologies IoT and integrate it in various fields.
- Analyze various social networking platforms and use them efficiently.
- Distinguish various cyber attacks and apply preventive measures.
- Understand the various soft skills needed to become successful.
- Analyze self and adapt oneself to work in a team.

Unit I: Fundamentals of Computers:

Introduction to computers- Components of computers-Working principle-Types of computers-Tablet-Notebook-Smart phone-PDA-Impact of computers on society-Types of software.

Unit II: Recent Trends in Computer Science and e-Governance:

IoT - applications- Mobile applications - E-Learning- E-Commerce - digital payments

Unit III: Social Media:

Face book-Twitter-Linked In-Instagram-Advantages of Social Networking-Issues/Risks of Social Networking-Protecting ourselves from social Networking problems-Cybercrimes-Hacking-Phishing- Cyber Security

Unit IV: Introduction to Soft Skills:

Learning objectives – What are soft skills?-Categories of Soft Skills-Integral Parts of Soft Skills.

Unit V: Understanding Self and Team Building:

Transactional Analysis (TA) - Structural analysis of Ego states- The functional model of Ego states - Egogram-Storkes - Life Position - Egogram and Life Positions Questionnaire-Team and Team Building- Features of effective creative teams

Books for Reference:

1. Peter Norton, Introduction to Computers 6th Edition
2. Charles P Pfleeger, Shari Lawrence Pfleeger, Security in Computing,I Edition, Pearson Education, 2003.
3. E.Balagurusamy, Fundamentals of Computers, McGraw Hill
4. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang , E-Commerce fundamentals and applications, Wiley Student edition
5. Benita Bhatia Dua, DeepaJeyaraman, Profit with Social Media, CNBC
6. Dr.K.Alex, Soft Skills, S.Chand & Co
7. http://www.digitalindia.gov.in/content/social-media-analytics
8. https://www.researchgate.net/publication/307878962_Introduction_to_E-Governance
9. http://www.ijqr.net/journal/v10
10. https://www.researchgate.net/publication/258339295_FUNDAMENTALS_OF_COMPUTER_STUDIES

SEMESTER - VI			
Core Integral III	**Molecular Biology and Bioinformatics**		
Code:18UBOI61	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Vision:

- To apply modern techniques in biological studies.

Mission:

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

Course Outcome

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	know chemistry of genetic material and details of its replication at molecular level	2	Un
CO-2	understand the general principles of chromosome organization at different phases of cell cycle	2	Un
CO-3	explain gene regulation mechanisms at various levels by which she can learn how it controls growth and development of an organism	4	Cr
CO-4	know complexity of gene expression in eukaryotes over prokaryotes	3	Un
CO-5	understand vector mediated gene transfer techniques including screening and identification of recombinants	6	Un
CO-6	know the gene cloning tools and their mysteries in success of gene cloning technology	8	Un
CO-7	attain hands on experiences in the techniques associated there of	4	Cr
CO-8	practice the advanced techniques in genetic engineering such as dna sequencing, blotting, dna amplification and fingerprinting	3	Ap

SEMESTER - VI			
Core Integral III	**Molecular Biology and Bioinformatics**		
Code:18UBOI61	**Hrs / Week: 4**	**Hrs / Semester: 60**	**Credits: 4**

Unit I: DNA as genetic material, structure and replication of DNA- semi conservative method. Molecular mechanism of Replication of DNA 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. Role of RNA polymerase and role of initiation and transcription factors. Types of RNA and their functions (brief). Translation - initiation, elongation and termination.

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

Unit IV: Bioinformatics – definition, scope. Biological databases - Nucleotide databases – NCBI, 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 Book:

1. Verma Agarwal. *Genetics, Molecular Biology, Ecology and Evolution*. Chand Publications, Multi colour edition

Books for Reference:

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.