POSTGRADUATE DEPARTMENT OF BOTANY
Programme for M.Sc., BOTANY from 2018 - 2019 onwards

S.No	COURSE TITLE	HOURS	CREDIT	Max
SEMESTER I				
PGB4521	Plant Diversity	7	5	100
PGB4523	Principles of Microbiology	7	5	100
PGB4425	Plant Diversity and Microbiology LAB	6(L)	4	80
PGB4227	Cell Biology and Genetics	3	2	40
PGB4229	Environmental Biology	3	2	40
PGB4331	CBCS (**Campus Ecology/ Pl. based enterprises)**	4	3	60
	Total	**30**	**21**	**420**
SEMESTER II				
PGB4522	Plant Systematics	7	5	100
PGB4524	Biomolecules	7	5	100
PGB4426	Plant Syst. & Biomolecules LAB	6(L)	4	80
PGB4428	Mycology and Pathology	6	4	80
PGB4330	CBCS (**Trends in Agriculture/ Plants and people)**	4	3	60
	Total	**30**	**21**	**420**
SEMESTER III				
PGB5621	Physiological Biochemistry	7	6	120
PGB5623	Morphogenesis	7	6	120
PGB5425	Physi. Bio. and Morpho. LAB	6(L)	4	80
PGB5527	Molecular Biology	6	5	100
PGB5329	Biol.Tech and Res.Method	4	3	60
	Total	**30**	**24**	**480**
SEMESTER IV				
PGB5722	Biotechnology	8	7	140
PGB5424	Gen. Eng, PTC and Ind. Mic. LAB	6(L)	4	80
PGB5326	Nanobiology	4	3	60
PGB5328	Systems Biology	4	3	60
PGB5730	Projects	8	7	140
	Total	**30**	**24**	**480**

CREDITS (21+21+24+24=90)

CBCS

Campus Ecology	**SEM (I)**
Plant based enterprises	**SEM (I)**
Trends in Agriculture	**SEM (II)**
Plants and people	**SEM (II)**

PLANT DIVERSITY

PGB4521 **7Hrs/5 Cr**

PREAMBLE: Students will explore the stupendous variation in the organization of internal and external morphology encountered in cryptogamic plants. The complexity of these features they will unravel in the light of lines of evolution. They will appreciate the interrelationship among them. Students will learn the lessons from the past fossil history to relate it to the present.

OBJECTIVES

to have a wider understanding of plants' evolutionary trend.

to get exposed to the vistas of phylogenetic relationships among Archegoniates.

to get to know the complexity and simplicities in their structure, organization and life pattern

UNIT I: Paleontological History: Earth as a living planet – origin of life – evolution of green plants through ages – geological timescale – continental drift – kingdom classification – mega extinction and speciation – classification and characterisation of major plant groups – fossils and fossilization.

UNIT II: Algae: General features – criteria for various classifications – thallus organization – biology and distribution – evolution of life cycle patterns – fossil algae – ecology and economic importance – algal research in India and key contributors – algae as symbiont – biology of lichens.

Unit III: Bryophytes: General features, distribution and ecology – variations of gametophytes and sporophytes – classification and inter-relationships – trends in bryology (Sphagnales and Takkakiales) – progressive and retrogressive evolution.

Unit IV: Pteridophytes: General features and distribution – origin of land plants – evolution of stele – alternation of generations, heterospory and seed habit – structural variations in gametophytes and sporophytes – apogamy and apospory – aquatic ferns – contributions of Indian pteridologists.

Unit V: Gymnosperms: Origin and evolution of seed bearing plants – general features of Cycads, Conifers, and Gnetopsids – morphology, anatomy and reproductive biology – evolution of seed – fossil gymnosperms – origin of angiosperms.

TEXT BOOKS

Cavers, F.1971. The interrelationship of bryophytes. Dawsons Pallwall. ISBN -0-521-66794-1

Chopra, R.N.2001. Biology of Bryophytes. Narosa publishers. ISBN: 81-224-343- 9

Lee,R. E. 2009. Phycology. Cambridge University Press. ISBN: 978-0521-14144-42.

Rashid, A. 1982. An introduction to Pteridophyta. Vikas publishing Co. (repr.ed). ISBN: 81- 259-0709-2

Sporne, K. R. 1962. The morphology of Pteridophytes. Hutchinson University Library. California. ISBN 978009123861

Sporne, K.R. 1965. The morphology of gymnosperms: The structure and evolution of primitive seed plants. B. I. Publications Pvt. Ltd. ISBN 81 7225 0398. 10.

7. Stewart, W.N and Rothwell G.W. 2010 Paleobotany and the Evolution of Plants. Cambridge University Press (2nd Edn). ISBN – 10:0521126088

REFERENCE BOOKS

Bell, P.R. and A.R. Hemsley. 2000. Green plants, their origin and diversity. Cambridge University Press, U.K. (2nd Edn). ISBN: 0-521-64109-8

2. Bold, H.C. and Wynne, M.J. 1985. Introduction to the Algae*:* Structure and Reproduction. 2nd Edn. Prentice Hall. Englewood Cliffs, New Jersey. ISBN: 978-0134777467

Fritsch, F.E. 1945. The structure and reproduction of the algae. Vikas publishing Co. ISBN: 0-521-77051-3.

Ingrouille M and Eddie B 2006., Plant diversity and evolution. Cambridge Univ. Press. ISBN 0 521 79433 1.

Johri.R. M., Latha.S and Sharma.S. 2009. Text book of Pteridophyta. Wisdorn Press. ISBN 978 81 9086 35 82.

Kumar, H.D. 1988. Introductory Phycology. East West press. ISBN: 81- 859- 3896-2.

Morris, I. 1971. An introduction to Algae. Hutchinson University Librarary. ISBN: 0-090-80713-8

Smith, G.M. 1966. Cryptogamic botany vol. 1. Algae and Fungi. Tata McGraw-Hill Book Company. (2nd ed.).ISBN : 0-070-99576-1.

Vanterpoorten, A. and Goffinet,B. 2009. Introduction to Bryophytes. Cambridge Press. ISBN: 978-0-521-70073-3

PRINCIPLES OF MICROBIOLOGY

PGB 4523 **7hrs/5Cr.**

PREAMBLE: This course enablesstudents to understand the basic concepts in microbiology and microscope as a tool to explore the microbial life. The emphasis will be given to their cosmopolitan distribution, diversity and ability to adapt in different environments. Microbes in different environmental conditions will be discussed with practical examples. Applied microbiology section will provide a glimpse on the industrially important microbes.

OBJECTIVE

- to understand the basic concepts in microbial diversity, metabolism and genetics.
- to make the students knowledgeable with respect to the subject and its practicable applicability.
- to promote understanding of basic and advanced concepts in microbiology.
- to expose the students to different processes used in industries and in research field.
- to develop their ability to apply the knowledge of microbiology in day to day life.

UNIT I: General Microbiology: History – scope – microbial diversity – extremophiles – ultra-structure of eukaryotic and prokaryotic cells – human microbiome – natural classification, phylogenetic approach – numerical taxonomy (simple match coefficient and

Jaccard coefficient), modern approach – base composition – nucleic acid sequencing (RNA fingerprint – 5S rRNA and 16S rRNA) – Bergey's classification.

UNIT II: Tools and Techniques: Microscopy (brightfield, darkfield, phase-contrast, fluorescence and electron microscopy) – microbial nutrition – quantitative measurement of bacterial growth – sterilization and disinfection – physical and chemical agents – methods of isolation – axenic cultures – maintenance and preservation.

UNIT III: Biology of Bacteria and Viruses: Energy production (anaerobic fermentation – aerobic respiration) – bacterial recombination (conjugation – transduction – transformation.) Viruses **(**general characteristics, structure, composition and classification of viral genomes.) bacteriophages (morphology and structure of T4 and λ phage.) – classification of viral vaccines – rabies and HIV.

UNIT IV: Environmental Microbiology: Air microflora (indoor and outdoor), soil microflora (diversity and abundance) – organic matter decomposition – biological nitrogen fixers (symbiotic and asymbiotic) – aquatic microflora (fresh and marine) – microbes in biodegradation, biodeterioration and bioremediation – potability, microbial assessment and purification of water – waste water treatment – solid waste treatment – source of food and energy.

UNIT V: Applied Microbiology: Scope – intrinsic and extrinsic factors affecting the growth of microbes – food microbiology (microbes in food, and spoilage, prevention and preservation methods – functional foods (probiotics, prebiotics, synbiotics and nutraceuticals) – dairy microbiology (microflora of raw milk, processed milk, spoilage and defects, fermented milk and microbiological standards of milk, milk products) – clinical microbiology (common pathogens, protocol for specimen collection, handling, transportation, processing, laboratory safety and infection control.) – applications of microbes in agriculture – bioinoculants – biofertilizer (types, mass production and quality control).

TEXT BOOKS

Dubey, R. C. and Maheswari, D. K. 2013. A Textbook of Microbiology, S. Chand & Comp. ISBN 81-219-2620-3

Pelczar, H.J. E.C.S. Chan and N.R. Kreig. 1996. Microbiology concepts and applications. McGraw Hill Inc. ISBN 0-07-049234-4

REFERENCE BOOKS

Atlas, M R. 1997. Principles of Microbiology. Wm. C. Brown Publishers. ISBN 0-8151-0889-3

Hull, R. 2004. Plant Virology.4th Edn. Academic Press., ISBN 0-12-361160-1

Madigan M.T. and Martinko, J. M. 2006. Biology of Microorganisms, 11th ed., Pearson Prentice. 9780132017848 and 0132017849

Perry, J. J. and Stanley, J. T. 1997. Microbiology Dynamics and Diversity. Saunders College Publishing. ISBN 0-03-053893-9

Prescott, M. J., Harley, J. P. and Klein, D. A. 2008. Microbiology, 7th ed. WCB McGraw Hill. ISBN 978 007-126 727 4

Stanier, R.Y. 1987. General Microbiology. 5th Ed. McMillan Education Ltd. ISBN 0-333-41768-2

Talaro, K. P. and Talaro, A. 2002. Foundations in Microbiology. McGraw Hill Publ. ISBN 0-07-232042-7

PGB 4425 PLANT DIVERSITY AND MICROBIOLOGY LAB 6Hr /4Cr

PLANT DIVERSITY

PREAMBLE: Students will explore the enormous variation in the organization of internal and external morphology encountered in cryptogamic plants. The complexity of these features they will unravel in the light of lines of evolution. They will appreciate the interrelationship among them.

I. ALGAE: Taxonomy, thallus organization and reproductive structures of the following taxa:

Chlorophyta – *Chlamydomonas, Volvox, Ulothrix, Oedogonium, Cladophora, Spirogyra, Fritchiella, Coleochaete, Chaetomorpha, Caulerpa, Chara.*

Phaeophyta – *Dictyota, Padina* and *Sargassum*

Rhodophyta – *Batrochospermum, Gracilaria, Polysiphonia*

Sea weeds- Collection and the identification of macro algae and agarophytes from coastal lines

II. BRYOPHYTES: Study and the evolution of the thallus organization of the sporophytic and gametophytic structures of following taxa:

Marchantiales – *Riccia, Targionia, Marchantia* **Jungermanniales**

6..Anthoceratales – *Porella, Anthoceros* **Bryopsida** – *Sphagnum, Funaria* and *Polytrichum*

Pteridophytes: Study and the evaluation of the following taxa:

7. **Psilopsida** – *Psilotum,* **Lycopsida and Sphenopsida** – *Lycopodium, Selaginella, Isoetes, Equisetum*

Pteropsida and Leptosporangiate ferns - *Marsilea, Salvinia,Azolla,Adiantum, Gleichenia and Pteridium.*

IV. Gymnosperms: Morphology and anatomy of vegetative and reproductive structures of the following types

Cycadopsida : *Cycas, Zamia*

Coniferopsida : *Pinus, Cupressus, Podocarpus, Araucaria*.

Gentopsida: *Gnetum*

Fossil Pteridophytes and Gymnosperms - Fossil cycads (*Lyginopteris oldhamia* Stem TS (*Lyginodendron*), *Lyginopteris* male (*Crassotheca*); *Lyginopteris* rachis (*Rachiopteris aspera*); *Lyginopteris* pinnae (*Sphenopteris*), *Botryopteris* root, sporangia; petiole (*Botryopteris ramosa*), TS of stem (*Botryopteris cylindrica*). *Lepidodendron* -Stem (leaf base), periderm (*Stigmaria*); Medullosa.

Field Visit: Field trips to the Eastern and Western Ghats to study plants in their natural habitats.

REFERENCE BOOKS

1. Bold, H. C. & Wynne, M. J. 1985. Introduction to the Algae: Structure and Reproduction. 2nd Edition. Prentice Hall. Englewood Cliffs, New Jersey. ISBN : 9780134777467

Cavers, F. 1971. The interrelationship of bryophytes. Dawsons Pallwall. ISBN -0-521-66794-1

Fristch, F. E. 1945. The structure and reproduction of the algae. Vikas publishing Co. ISBN: 0-521-77051-3.

Kumar, H.D. 1988. Introductory Phycology. East West press. ISBN: 81- 859- 3896-2.

Morris, I. 1971. An introduction to Algae. Hutchinson University Library. ISBN: 0-090-80713-8

Rashid, A. 1998. An introduction to Bryophyta. Vikas publishing Co ISBN: 81-259-0569-

Rashid, A. 1982. An introduction to Pteridophyta. Vikas publishing Co. (repr.ed). ISBN: 81- 259-0709-2

Sporne, K. R. 1965. The morphology of gymnosperms: The structure and evolution of primitive seed plants. B.I.publications Pvt.Ltd. ISBN 81 7225 0398.

MICROBIOLOGY

PREAMBLE: Students will get hands on training in basic microbial culture technique. They will be exposed to the standard methods of microbial load analysis in environmental samples, staining techniques and growth studies. Students will be able to know about the basic aspects of isolation, characterisation of fungi and diversity of macrofungi. Methods involved in screening microbes for commercial enzymes production. Experiments on antagonistic studies will help them to screen chemicals and microbes to be used in microbial control strategies.

Principles of Microscopy – microbial photographs.

Preparation of culture media, sterilization - moist heat – dry heat- radiation-filtration.

Pour plate- spread plate, streak plate-serial dilution – hanging drop.

Microbial examination of different habitats – CFU, MPN, colony characterization.

Staining techniques - Smear preparation, Gram staining, endospore staining, capsular staining and fungal staining.

Microbial enzyme screening: amylase, protease, lipase, cellulase.

Growth studies: Growth curve – heamocytometry and turbidometry

Actinomycetes – isolation and characterization

Fungal endophyte study – isolation technique.

Type study - *Mucor*, *Rhizopus*, *Pilobolus* and *Aspergillus*

Macrofungal fruiting bodies - diversity

Disease symptoms and assessment methods - Paddy blast scale.

Evaluation of fungicide: Slide germination technique and inhibition zone technique

Biological control – Antagonistic property.

Visit to microbiological lab/ microbe-based industry.

REFERENCE BOOKS

Cappuccino, J. G. and N. Sherman. 2003. Microbiology – A Laboratory Manual. Pierson Education. ISBN 81-2970265

Gunasekaran, P. 2000. Laboratory Manual in microbiology. ISBN 81-224- 0783-8

Anonymous 1983. Field problems of tropical rice. International Rice Research Institute, Philippines. ISBN 971-194-080-8

CELL BIOLOGY AND GENETICS

PGB 4227 **3Hr / 2Cr**

PREAMBLE: This course unravels the principles of heredity and variations among living organisms that obeys the principles of Mendel and post Mendelian concepts. Topics to be discussed include allelic and gene interaction, polygenic in heritance, sex inheritance, linkage and crossing over. The students will learn about gene maps to locate the loci of genes, its aberration and influence on human traits. Students will also be introduced about the structure and components of cell, its organelles and functions. Various modes of cell division and special emphasis on chromosome and DNA will be dealt. OBJECTIVE**:**

to gain analytical and problem solving skills related to genetics.
to learn the basics of cell and its organelles, that will be a platform for learning molecular biology of cell.
to understand holistic picture of life cycle pattern of a cell

UNIT 1: **Cell architecture**: Concept of Cell – ultrastructure and organization of plasma membrane – cell wall – cytoskeleton nucleus – nucleolus – chromosome – chloroplasts, mitochondria – lysosome – peroxisomes – glyoxysomes – centriole – flagellum – cilium and vacuoles – cell cycle and cell division.

UNIT 2: **Concepts of Heredity:** Pre-Mendelian and Mendelian genetics – classical experiments in plants – phenotype and genotype variations – allele and gene interactions – application of statistics in genetics – laws of Mendel – Mendel-Fisher Controversy.

UNIT 3: **Post Mendelian Era**: Case study for sex determination – linkage and crossing over – gene Maps (*Neurospora*, *Yeast*, *Caenorhabditis elegans*, *Drosophila melanogaster and Homo sapiens)* – recombination – homologous and non-homologous recombination including transposition – evolution of sex chromosome.

UNIT 4: **Structural and numerical alterations of chromosomes**: Mutations (types, causes and detection) – lethal, conditional, biochemical loss and gain of function – insertional mutagenesis – deletion – duplication – inversion – translocation – polyploidy and ploidy level

UNIT 5: **Human Genetics** : Chromosomal aberrations – pedigree analysis – lod score for linkage testing – karyotyping – polygenic inheritance – heritability and its measurements.

TEXT BOOKS

Gerald Karp. 2013. Cell Biology. 7th edition. John Wiley & Sons. ISBN:1118318749

Sinnot, E. W. 1991. Principles of genetics. 3rd edition. McGraw Hill Inc. ISBN: 0 07099 4137.

Bruce, A., Bray, A., Karen, H., Alexander, J., Julia, L., Martin. R., Keith, R., and Peter W. 2014. Essential Cell Biology 4th edition. Garland Science& Taylor and Francis Group. ISBN:978 0 8153 4454

REFERENCE BOOKS

Gardner E. J., Simmons M. J., Snustard, D P. 2006. Principles of Genetics. John Wiley & sons Inc. ISBN:8126510439

Karp, G., Janet I., and Marshall, W. 2015. Cell and Molecular Biology, Binder Ready Version: Concepts and Experiments. John Wiley & Sons. ISBN:1118886143.

Klug W S., Cummins, M., Spencer C. A., and Palladino. M.A. 2016. Concepts of genetics. Pearson Education India. ISBN:1 292 077 263

Russel P J. 2002. Essential genetics. 2nd ed. Blackwell Scientific Publishers. ISBN:0 80534697 X

Stansfield W D. 1991. Theory and problems of genetics. 3rd edition. McGraw Hill Inc. ISBN:070060877

ENVIRONMENTAL BIOLOGY

PGB 4229 **3Hr/ 2 Cr**

PREAMBLE: This course imparts knowledge on scientific understanding of environment structure, components and its dynamics in maintaining its equilibrium. It helps the students to be aware of the fact that how human activities impact the ecological equilibrium and strategies employed by the world community to conserve nature for better future.

OBJECTIVES:

to know the principles of individual organisms interacting among themselves and the environment

to explore the diverse habitat of the plants and specialization of the internal and external morphology to suit that purpose

UNIT I: Elements of environment: Components of environment – Liebig's and Shelford's law of limiting factors (Temperature, light and salinity) – salient features (lithosphere, atmosphere, hydrosphere and biosphere.)

UNIT II: Biocoenology: Structure, Types (Pond, marine, forest and detritus ecosystem) – ecological pyramids – food chain – food web – ecological niches – energy flow – types of productivity and their measurement – biogeochemical cycles - carbon sequestration - cybernetics of ecosystem.

UNIT III: Community level Interaction: Physiognomy, classification of community (Clements), concept of climax community – ecotone – edge effect – ecospecies – ecological amplitude – plant succession (causes and process of hydrosere, xerosere) – allopatric and sympatric speciation –ecological barriers.

UNIT IV: Population Ecology: Group attributes (natality, mortality, biotic potential, age distribution, gene pool) – growth dynamics (growth curves, survivorship curves, carrying capacity, r and k selection) – population cycles (fluctuations and equilibrium) – population regulation (density dependent and density independent factors)

UNIT V: Human and Environment: Anthropogenic impact on environments – aquatic (eutrophication, pesticide pollution, bioaccumulation, biomagnifications) – terrestrial (deforestation, desertification, habitat fragmentation, solid waste disposal, pacific gyres) –

atmosphere (ozone depletion and global climate change) environment – conservation strategies (Rio earth summit, Kyoto protocol, WWF, IUCN, Red data book, *ex-situ* and *in-situ* conservation of biodiversity).

TEXT BOOKS

Kumar H,D.,(1992), Modern concepts of Ecology, Vikas Pub. House Pvt. Ltd., New Delhi.

Sharma, P. D. 2017. Ecology and Environment. Rastogi Publications *ISBN*: 9789350781227.

Subramanyam, N.S., Sambamurty, A.V.S.S. 2000. Ecology , Narosa Pub. ISBN-817319289-8.

Tansley (2003) , An introduction to Plant Ecology, Discovery Pub. House , New Delhi. ISBN -81-7141-203-3

Verma, V. (2011) Plant Ecology, Ane Books Pvt. Ltd., New Delhi. ISBN- 978-93-8061-800-5

REFERENCE BOOKS

Kormondy,E.J. 2004. Concepts of Ecology , 4th Edi., Prentice –Hall of India Pvt. Ltd., New Delhi. ISBN- 81-203-1148-5

Odum, E P. 1970. Basic Ecology . Holts –Saunder Edition, CBS college Publizing, Japan . ISBN- 4-8337-0080-8

Subramanyam, N.S., Sambamurty, A.V.S.S. (2000) Ecology , Narosa Pub. ISBN- 81-7319289-8.

CAMPUS ECOLOGY

PGB 4331 **4 Hr / 3 Cr**

PREAMBLE**:** This course stresses the importance of ecological knowledge to preserve and protect the nature and its elements *per se* in the campus. Awareness of our own ecosystem alone can give an insight towards the conservation of our own environment. The present course aimed at giving quality education on the basics of ecosystem, in order to give a clean atmosphere within the campus. Uniqueness of the flora and fauna in the campus will tickle the young mind to broaden their vision towards the biodiversity of the campus. After the completion of the course the students will be able to understand, appreciate and conserve the nature.

OBJECTIVES**:**

- to make the students understand and appreciate the ambience of the campus
- to make the students appreciate the physical climate of the campus
- to feel the diversity of the campus
- to study the ecological diversity of the campus using simple methods

UNIT I: Understanding the campus: Origin and history – departments – etymology – building designs – architecture – various facilities – organizational set up – satellite campus – origin and history – beneficiaries.

UNIT II: Biodiversity: flora and fauna – seasonal variations – exotic plants and weeds – horticultural species – arboretum – species of birds and animals – importance of flora and fauna

UNIT III: Ecoclimate: Serenity of the campus – ecological factors – rainfall – temperature – altitude – impact of plants – campus as an ecosystem – litter fall – rain water harvesting – water crisis and conservation.

UNIT IV: Waste regulation: waste disposal – litter *vs* solid waste – basics of solid waste management – pollution (air, water and environment) – ecological ethics – importance of diversity – atmospheric cleanliness – future scope.

UNIT V: Eco-watching: Tree cover – quadrat analysis (density, abundance and frequency) – basics of bird watching – tree identification – unique trees and animals – litter drop method – basics of aerobiology.

TEXT BOOKS

Anonymous, 2016. Green Audit Report. The American College, Madurai.
Odum, E. & Barrett G.W. 2005. Fundamentals of ecology. Cengage Learning India Private Limited ISBN 8131500209, 9788131500200
Sharma, P. D. 2017. Ecology and Environment. Rastogi Publications *ISBN*: 9789350781227.

REFERENCE BOOKS

Anonymous 2005. The American college Commemoratory publication SCILET
Bor N.L. & Raizada M.B. 2000 Some Beautiful Indian Climbers and Shrubs, Bombay Natural History Society. Bombay
McCann,C. 1966. 100 Beautiful trees of India – A descriptive and pictorial handbook. D.B.Taraporevala Sons & Co Private Ltd, Bombay.
Sahni K C. 1998. The Book of Indian Trees. Bombay Natural History Society. Bombay. ISBN – 13: 978 – 0195645897
Santapau, H. 1966. Common trees, India land and the people, National book Trust India New Delhi. ISBN: 81 – 237 – 0288 – 4

PLANT BASED ENTERPRISES

PGB4331 **4Hr / 3 Cr**

PREAMBLE: This course will survey the overall business potentiality of plants and practical aspects of food fermentation in regard to beer, wine, and cheese/dairy. Focus will be on the processes of converting source material to finished products. Students will gain a fundamental understanding of theory and technology involved in it.

OBJECTIVES:

to enable students to understand trade based on plant produce.
to sensitize the students on the use of organic products.
to facilitate the students to use microbes and mushrooms for commercial exploration

UNIT I: Plant Trade: Opportunity identification, positioning as an entrepreneur – building and presenting a business plan –funding and entrepreneurial finance – marketing strategies – talent acquisition – management – practical insights into challenges – trade license and registration marks – sources of finance – selection of site and factory construction

UNIT II: Fresh and Dry Plant Market: Nursery – cut flowers – raw drugs – natural dyes – food and food supplements – herbs.

Unit III: Processed Products: Fermented food products – milk and milk products – alcoholic fermentations – yeast fermentations – jam – jelly – squash – patisserie.

Unit IV: Farm Supplements: Bio-fertilizers – microbes as biofertilizers – green manures – mass cultivation of *Azolla, Rhizobium* and *Spirulina* – bioconversion of organic wastes – composting processes (vermi, home composting)

UNIT V: Mushroom Technology: Identification – characterization – collection – edible and poisonous – nutritional and medicinal value – formulations of fruiting substrates, spawning and culture techniques – protocols for cultivation (bag, tray, column and log culture – indoor and outdoor cultivation) – harvesting, storing, packing – marketing strategies.

TEXT BOOKS

Bahl, N. 2000. Hand book on mushroom cultivation. 4th Ed. Oxford & IBH Publishing Co. New Delhi. ISBN: 8120413997

Biswas, S, Datta, M and Nagachan, S.V. 2012. Mushrooms- A manual for cultivation. PHI Learning Private Limited, New Delhi. ISBN: 978-8120344945

Krishnamoorthy, 1999. Hand book of mushroom cultivation. TNAU Publications, Coimbatore, Tamil Nadu, India.

SubbaRao, N. S., 1988, Biofertilizers in agriculture. Oxford & IBH Publishing Co., New Delhi. ISBN: 9789061914051

SubbaRao, N. S., 1995. Soil microorganisms and Plant Growth. Oxford & IBH Publishing Co., New Delhi. ISBN: 1886106185

SubbaRao, N. S., 1993. Biofertilizers in agriculture and forestry. India Book House Ltd. New Delhi. ISBN-13: 978-1881570295

REFERENCE BOOKS

Chang, T.S. and Hayes, W.A. 1978. The biology and cultivation of edible mushrooms. Academic Press, New York. ISBN: 9781483271149

Nair, M.C., Gokulapalan, C. and L. Das, 1997. Topics on mushroom cultivation. Scientific Publishers, Jodhpur, India.

PLANT SYSTEMATICS

PGB 4522 **7Hr / 5Cr**

PREAMBLE: The present course is aimed at giving a holistic account on the nuances of flowering plants such as history, classification and the relationship with non flowering plants. Nomenclature of higher plants is another wing of plant systematics which ought to be given importance. Teaching herbarium techniques on hand, might give the students an insight regarding the study of plant specimens and appreciate the morphology of plants better. Alternative methods of classification of plants will make the students see beyond microscope to the digital world.

OBJECTIVES**:**

to explore the diversity of angiosperms
to understand and appreciate the evolutionary trend in the plant world.
to inculcate knowledge on the rules and regulations of ICN
to understand the modern gadgets in plant systematic
to learn about the use of modern gadgets in plant systematics

UNIT I: Ascent of angiosperms: Origin of flowering plants – angiosperm phylogeny – co -evolution – basal angiosperms – ecological dominance of angiosperms – latitudinal and altitudinal zonation of floristic wealth, biomes – physiognomy and structures of forest in southern India – endemism and hotspots.

UNIT II: History of classification: Pre-Linnaean, Linnaean and post Linnaean period – contributions of Linnaeus, Bentham and Hooker, Engler and Prantle and Bessey – angiosperm phylogeny groups APG I, II, III, and IV – ethnobiological classification of plants.

UNIT III: Herbarium taxonomy: Objectives and functions – herbarium preparation – collection – pressing – poisoning and drying – identification – mounting – labeling – incorporation – herbarium ethics – maintenance – important herbaria – BSI (Botanical Survey of India), and TBGRI (Tropical Botanical Garden and Research Institute) Rapinat herbarium (RAPINAT) – Kew Garden (KEW).

UNIT IV: International Code of Nomenclature: History of different codes – botanical congress – ICBN to ICN (Melbourne code 2010), IAAT (Taxon), IAPT (Rheedea) – principles of ICN – taxonomic hierarchy – active principles (priority of publication, typification, effective publication) valid names, rejection of names, author citation – botanical naming (polynomial, trinomial and binomial).

UNIT V: Trends in classification: Cladistics and biosystematics (chemo, sero and molecular taxonomy) **–** numerical taxonomy – Kubitzski system – use of computers – automated pattern recognizing systems – matrices, online data bases: IPNI (International Plant Names Index) – Index Kewensis and The Plant List.

TEXT BOOKS

Bhatacharyya, B. 2005. Systematic Botany, Narosa Pub. House Pvt. Ltd. ISBN 81-7319-542-0

Krishnamurthy, K.V. 2003. A text Book on Biodiversity (Principles and Practice), Science Publishers, USA. ISBN 1578083257.

Lawrence, G. H. M. 1964. Taxonomy of Vascular Plants. Oxford and IBH Publishers. ISBN 17-L5-5

Prathipalsingh, 2010. Introduction to biodiversity. Ane books Pvt. Ltd. New Delhi. ISBN 978-1-8052-185-0

Singh, G. 2007. Plant systematics theory and practices. Oxford and IBH Publishing Co. ISBN 81-204-1652-x

Sivarajan, V. V. 1999. Introduction to the principles of Plant Taxonomy. Oxford & IBH publishing co. ISBN: 81-204-0445-9.

Pandey, B.P. 2013. Taxonomy of Angiospherms, S. Chand Publishing, New Delhi. ISBN 9788121909327

REFERENCE BOOKS

Davis, P. H. & Heywood, V. H. 1972. Principles of Angiosperm taxonomy. Edinburgh, London, Publ. ISBN 0 8825 5129 8

Henry, A. N. and Chandrabose, M. 1979. An aid to the International Code of Botanical Nomenclature. Today and Tomorrow Publ. ISBN 8 1701 9094 0

Jain, S. K. and Rao R. R. 1993. A handbook of field and herbarium methods. Today and Tomorrow Publ. ISBN 8 1701 9130 0

Jones Jr. SB and Luchsinger AE 1987. Plant systematics. McGraw- Hill Book Company. ISBN 0-07-032796-3.

Stace, C.A. 1989. Plant taxonomy and biosystematics, 2nd Ed. Edward Arnold, ISBN 0-7131-2955-7

Simpson, M. G. 2010. Plant Systematics, 2nd Ed. Academic press ISBN 978-0-12-374380-0.

BIOMOLECULES

PGB4524 **7 Hr / 5 Cr**

PREAMBLE: The course is designed to give intricate details on the structural classification of macro and micromolecules. The flow of carbon and nitrogen in the biological system shall be traced in the process of making and breaking primary and secondary metabolites and hormones. The secondary metabolism in plants and the biosynthesis of secondary metabolites would be discussed in detail.

OBJECTIVES **:**

To provide the basics of particles and the principles of their interactions.

To enable the students to appreciate integration of various metabolic pathways

UNIT I: Molecules of life: Atoms, molecules, bonds, functional groups, periodic table, nomenclature, units of measurement – physical constants – concepts of pH and buffers – simple inorganic molecules to macromolecules, reducing power, energy rich molecules – basic design of metabolism.

UNIT II: Carbohydrates: Configurational and conformational aspects of carbohydrates – structure, properties and importance of structural (cellulose and chitin) and storage

polysaccharides (starch and glycogen) – glycolysis – pentose phosphate pathway – Krebs cycle.

UNIT III: Amino acids, Proteins and Enzymes: Structure and classification, physical, chemical and optical properties of amino acid – peptides – Ramachandran Plot – porphyrin biosynthesis – amino acids metabolism (synthesis and deamination) – enzyme catalysis – substrate specificity – kinetics and allostearism – coenzymes.

UNIT IV: Lipids & Nucleic acids: Chemical nature of lipids (fatty acids, triacylglycerol, phospholipids, waxes, spingolipids) – topology of biological membrane – fluid mosaic model – biosynthesis of membrane lipids – lipid metabolism (biosynthesis, oxidation and energy budget) – chemical structure and base composition – biosynthesis and break down of nucleotides – metabolic regulation.

UNIT V: Micromolecules: Secondary metabolites – terpenoids (synthesis of IPP) – alkaloids and flavonoids – vitamins

TEXT BOOKS

Voet, D, J. G. Voet and Pratt, C. W. 2008, Principles of Biochemistry, John Willey and Sons, Publ. ISBN 13-978-0470-23396-2

Devlin, T.M. 2002, Biochemistry, 5th Edn. Wiley-Liss Publ. ISBN 0-471-411361.

REFERENCE BOOKS

Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P., 2002. Molecular Biology of the Cell, 4th Edn. Garland Science Publ. ISBN 0-8153-4072-9.

Berg, J. M., Tymocozko, J. L. and Stryer L. 2007. Biochemistry, 6th Edn, W.H. Freeman and Company, ISBN 0-7167-8724-4

Dey, P. M. and Harborne, J. B. 2000. Plant Biochemistry. Harcourt Asia, Pvt. Ltd. Singapore. ISBN 0-12-214674-3 (HB)

Gurr, M.I., Harwood, J. L. and Frayn, K. N. 2002 Lipid Biochemistry 5th Edn. Freeman Publ. ISBN 1-4039-4876-3

Mathews, C.K., Van Holde, K. E. and Ahern, K. G., 2005, Biochemistry, Pearson Ed. Publ. ISBN 81-297-0215-0

Nelson, D. L. and Cox, M. M. 2008. Principles of Biochemistry 5th Ed., CBS Publ. ISBN 1 4292 1241 1.

Murray, R. K., D. K. Granner, P. A. Mayes, and V.W. Rodwell, 2000. Harpers Biochemistry, 25th Ed., McGraw Hills Pub. ISBN 0 8385 3684 0.

PLANT SYSTEMATICS AND BIOMOLECULES LAB

PGB 4426 **6H/4Cr**

PLANT SYSTEMATICS

PREAMBLE: This course focuses on exploring the diversity of the Angiosperms. The nuances of this course will help students to understand and appreciate the evolutionary trend in the plant world. Hands on experience will envision the students to understand the plant morphology of vegetative and reproductive parts. Students will be trained to botanically describe and identify the species with the help of available local floras. Field trips will be arranged to study the plants in their natural habitat which will further enrich the young minds and direct them towards the conservation of the higher plant.

OBJECTIVES:

to explore the diversity of angiosperms
to understand and appreciate the evolutionary trend in the plant world.
Hands on experience to study plant morphology and vegetative parts
To botanically describe and identify the species with the help of available local floras
to study the plants in their natural habitat through field trips

Morphology of flowering plants: General description and traits of taxonomic interest

Herbarium preparation (Traditional methods).

Phytography (describing plants with technical terms).

Construction of dichotomous keys (indented and bracketed key)

Identification of local plants using local floras

Phenological study on select tree species in the campus.

Characterisation of different forests in Southern India

Analysis of plant characters - Polypetalae

Analysis of plant characters - Gamopetalae

Analysis of plant characters - Monochlamydae

Analysis of plant characters - Monocots

Computer databases in plant identification

Field visit to at least three of the listed destinations -Alagar Hills, Kuttupatti, Karungalakudi, Kodaikanal, Coimbatore and Udagamandalam.

REFERENCE BOOKS

Gamble.J. S. 1954. The Flora of Presidency of Madras. Botanical Survey of India Calcutta. ISBN 8 1211 0452 1.

Jain, S. K. and Rao R. R. 1993. A handbook of field and herbarium methods. Today and Tomorrow Publ. ISBN 8 1701 9130 0

Lawrence, G.H.M. 1964. Taxonomy of vascular plants. Oxford and IBH publ. ISBN 0 0236 8190 X.

Matthew,K. M. 1995. An excursion flora of central Tamilnadu. Rapinat Herbarium. ISBN 8 1204 0940 X.

BIOMOLECULES

PREAMBLE: This lab course in designed to train students to analyse some of the metabolic compounds from plants. This laboratory course offers opportunities to learn many analytical techniques. Training in various methods of extraction, purification, isolation and quantification of macro molecules is also provided.

Carbohydrates – Qualitative
Carbohydrates – Quantitative tests.
Protein - Qualitative and Quantitative tests.
Estimation of free fatty acids and saponificaiton value.
Lipids – Separation of chloroplast lipids
Estimation of cholesterol.
Amino acids – Estimation of amino acids in biological samples.
Separation of amino acids by paper chromatography and Thin Layer Chromatography.
Protein separation by Polyacrylamide Gel-Electrophoresis.
Extraction and quantification of pigment (Lycopene & Curcumin).
Extraction and estimation of vitamins.
Extraction and estimation of phenolics

REFERENCE BOOKS

Cooper, T. G.1991. The Tools of Biochemistry, John Willey and Sons, Publ. ISBN 0 4711 7116 6.

Harborne, 1998. Phytochemical methods, Chapman and Hall, Publ. ISBN 0 4125 7270 2.

Jeyaraman, J. 1988. Laboratory Manual in Biochemistry, New Age International Pub., Ltd. ISBN 0-85226-428-3

Plummer, D. T., 2003. An Introduction to Practical Biochemistry, 3rd Edn. Tata McGraw Hills Pub Company, ISBN 0-07-0994870

Sadasivam. S and A. Manickam. 2008. Biochemical methods for Agricultural sciences, 2nd edn., New Age International Pub. Ltd., ISBN 978-81-224-2140-8

Willson, K. and J. Walker. 1994. Practical Biochemistry, Cambridge University Press, ISBN 0 5217 9965 1.

MYCOLOGY AND PATHOLOGY

PGB4428 **6Hr / 4Cr**

PREAMBLE: The course has been designed to give basic knowledge of fungi and plant pathology. The history and development in the field of plant pathology will be traced. The uniqueness of the fifth kingdom – fungi in terms of characteristics, growth pattern and reproduction will be discussed. Host pathogen interactions and stages in disease development will help to understand the pathogen, which in turn will facilitate the strategies of disease management. Etiology and management of important fungal, bacterial, viral and non parasitic diseases will be dealt.

OBJECTIVES:

to study about the plant diseases with special reference to Southern India.
to understand the unique features of fungi as a separate kingdom
to understand the diseases, symptoms, causal organisms – etiology of the diseases and control measures.

UNIT I: Fundamentals of Plant Diseases: History – classification – diagnosis and identification – Koch's postulates – gene for gene hypothesis – disease tetrahedron – pathogenesis (disease initiation, development and establishment) – parasitism (role of enzymes, toxins and growth regulators.)

UNIT II: Elements of mycology: General characters – habitat – growth pattern – nutrition types – cell wall (structure, composition) – fungal classification upto class level (Alexopolous and Mims) – modes of reproduction – parasexual cycle – fruiting bodies – fungal interactions (parasitic and symbiotic) – importance of VAM fungi – primary and secondary metabolites – commercial fungal enzymes.

UNIT III: Disease development and defense mechanisms: Disease development and influence of factors – inoculum and inoculum potential – hypersensitivity – pathogenic impacts on host physiology – host defense mechanisms - innate and induced – morphological and anatomical defenses – biochemical (phenols, phenolic glycosides, phytoalexins) – Pathogenesis Related Proteins (PR) – Systemic acquired and Induced systemic resistance (SAR and ISR).

UNIT IV: Diseases and Disease Cycle: Study of the following diseases with reference to their incidents – symptom manifestation and control measures – fungal (rust of wheat, blast of rice, Tikka of groundnut, Red rot of Sugar cane) – bacterial (Bacterial blight, Citrus canker) – mycoplasmal (Little leaf of brinjal, *phyllody of* sesamum – viral (Yellow vein mosaic disease) – nematode (Root knot of potato) – non- parasitic diseases (*Cuscuta, Striga).*

UNIT V: Disease management: Epidemiology – disease forecasting – concepts on prophylaxis, exclusion and legislation – plant quarantine principles – eradication (crop rotation, field sanitation, elimination of alternate hosts, soil treatment and seed treatments.) –management strategies (chemical and biological) – microbial antagonists [(bacterial, fungal and viral) mode of action, mass production and field application)] – engineered resistance against fungal, viral and bacterial pathogens – Integrated disease management (IDM).

TEXT BOOKS

Alexopoulos CG, Mims CW and Blackwell M. 1996. Introductory Mycology, John Wiley. ISBN 9814-12-612-8

Singh RS 2005. Plant Diseases. Oxford and IBH publishing. ISBN 8120416589

Mehrotra RS and Aggarwal.A. 2003. Plant Pathology. Tata McGraw Hill Pub. ISBN 0070473994

REFERENCE BOOKS

Agrios G. N. 2006. Plant Pathology. Elsevier Publication, Academic Press. ISBN-13: 9788131206393

Biswas S. B. and Biswas A. 1996. An Introduction to Viruses.4th Edn. Vikas Publishing House. ISBN 0706982207

Chaube H. S. and Pundhir V. S. 2005. Crop diseases and their management. Prentice Hall of India. ISBN 8120326741

Deacon J. W. 2006. Fungal Biology. Blackwell Scientific Publ. Oxford. ISBN 14051 6953 0

Dickinson, M. 2003. Molecular Plant Pathology. BIOS scientific Publishers, ISBN 0-203503309

Mukerji, K. G. and Bhasin, J. 1972. Plant diseases of India – A source book. Tata McGraw Hill, New Delhi.

Vidhyasekaran, P. 2008. Fungal Pathogenesis in Plants and Crops: Molecular biology and host defense mechanisms. CRC Press. ISBN 13: 9780849398674

PLANTS AND PEOPLE

PGB 4330 **4 Hr / 3 Cr**

PREAMBLE: The objective of the course is to highlight the importance of plants in our different facets of life. Plants have been part of human civilization from the pre-historic period. The contents are divided to give an overview of plants in different aspects of human being. References of plants in scriptures and Sangam literature will be cited and relevance at the context will be discussed. Cultures are identified based on their food and dressing habits, an overview of history of Indian cuisine will be traced specially with references to south India. Plants always served us as food and medicine the important plants used in the Indian system of medical practioners also included. OBJECTIVES**:**

to understand and track the history of civilization based on the plants as a focal point of reference
to understand the scientific details of the plants referred in the scriptures
to appreciate the importance of plants used as food, medicine and perfumes
to understand the rich heritage of plant-based medicines in India

Unit 1. Prehistorical evidences: Unravelling ancient civilization using plant based prehistoric evidences – cotton fabrics and dyes of prehistoric period – plants in ancient funerary rituals – pollen and paleoclimates

Unit 2. Scriptures: Forest and trees associated with Lord Buddha – plants in Bible and Quran – temple trees and sacred plants of India – sacred oil and fragrances used across the religious barriers.

Unit 3. Plants in literature: Cultural and biological diversity – Sangam landscape – Thinai concept – early livelihood strategies in Sangam literature – western literature.

Unit 4. History of Indian cuisine: Social history of food – dietary beliefs and cooking patterns of Indians – minor millets, spices and sweeteners of Indian origin.

Unit 5. Indian System of Medicine: Indian system of medicine – Siddha, Ayurveda and Unani – revitalization of indigenous medicinal practices and knowledge in south India.

TEXT BOOKS

Haberman, D. L. 2013. People Trees – Worship of trees in North India Oxford University Press. *ISBN*-13: 978-0199929160

Ahluwalia, S. 2017. Holy Herbs : Modern Connections to Ancient Plants, Fingerprint Publishers. ISBN 9788175994461

Achaya, K. T. 1998. Indian food: A Historical Companion, Oxford University Press, ISBN 0195644166, 9780195644166

Albala, K. 2013. Food: A cultural culinary history the great courses ISBN 10: 1598039474 ISBN 13: 9781598039474

Schmithausen, L. 2009**.** Plants in Early Buddhism and the Far Eastern idea of the Buddha-Nature of Grasses and Trees Published by Lumbini International Research Institute. ISBN 10: 9937217164, ISBN 13: 9789937217163

Nanditha, K. and Amirthalingam., 2014. Sacred plants of India, Penguin Books Limited ISBN 10: 0143066269

சீனிவாசன்,கு . சங்கஇலக்கியதாவரங்கள்,தமிழ்பல்கலலகழகம்

TRENDS IN AGRICULTURE

PGB 4330 **4Hr / 3Cr**

PREAMBLE: This course is designed for the non major students and stress would be given on the history, traditional agricultural practices and the cropping pattern practiced for generations. The period in which the production of food materials was surplus and extensive cultivation was practiced in order to cope up with the famine in india. Modern agricultural techniques have also been discussed to have a better understanding about the agricultural practices in India

OBJECTIVES:

to appreciate and relish the ancient agricultural talents
to have a better understanding about the agriculture
to know the traditional agricultural knowledge in our country
to assuage the ignorance from the young mind

UNIT I History of agriculture: Early civilization (Indus valley, Harappa, Mayan Inca, Egyptian, Chinese) – nomads, pastoralism, sedentism – river banks as cradle of civilization – domestication of plants – monoculture – Ganges delta farming – farming in southern India – Sangam literature – ancient crops.

UNIT II Traditional practices: Agronomy in India – irrigation methods (dam, kanmai/ oorani, ayakattu, anicut, ponds, lakes, channel, well, check dams) – irrigation systems – catchment area – reservoirs – manuring (farm, cattle, green manure) – multicropping – crop rotation.

UNIT III: Cropping pattern: Weather based cropping (Kharif, rabi and zadi) **–** Basic soil types – soil map of southern India – soil and crop selection – top soil – soil erosion and conservation (types and methods)

UNIT IV: Green revolution: History (famines in India) – government policies – construction of reservoirs – extensive cultivation – introduction of exotic varieties – fertilizers and pesticide industries – high yielding varieties – rural banks and road – seed banks – wild relatives of cultivars – contributions of Indian Scientists – IRRI, IARI, ICAR and TNAU – ecological backlash.

UNIT V: Modern practices in agriculture: Mechanization (seeding, weeding, manuring, harvesting) – intensive cultivation – hybrids – water saving devices – rain water harvesting – biofertilizers – underutilized crops for food security – organic and vertical farming – hydroponics and aquaponics – scope for agriculture in space.

TEXT BOOKS

Anonymous, 2011. Hand book of Agriculture, 6th ed. ICAR, New Delhi**.** ISBN 81-7164-050-8

Chandrasekaran, B., K. Annadurai, and E. Somasundaram, 2010. A textbook of agronomy, New Age International (P) Limited, Publishers, ISBN (13) : 978-81-224-2859-9

REFERENCE BOOKS

1. Carson, R. 1962. Silent spring, Mariner Books. ISBN 0-618-24906-0
2. Toffler, A. 1980. The Third Wave, Bantam books, United States ISBN 0-517-32719-8 (hardcover), ISBN 0-553-24698-4 (paperback)

Raychaudhuri, S.P. and Roy, M., 1993. Agriculture in Ancient India: A Report, ICAR Publication, New Delhi.

POSTGRADUATE DEPARTMENT OF BOTANY

Value Added courses
w.e.f. 2020-2021

Semester	Course code	Course Title	Hr.	credit
1	PGB421V	Algae and marine resource management	2	2
2	PGB422V	Nursery and Landscaping	2	2
3	PGB521V	Plant hybrid technology	2	2
4	PGB522V	Epidemiology and molecular diagnostics	2	2

PGB 421V Algae and Marine Resource Management 2 Hrs./2Cr.

PREAMBLE:

The course provides an overview of algal habitats with guidance for the scope of making

collections subscribing to its commercial importance and utility in industry, agriculture and as food, feed and medicine. It offers the know-how on growing; multiplying effectively utilizing the given algal resource that approaches pursuing innovation to enhance the value of resource and providing for entrepreneurial ventures can be probed.

At the end of the course, the students will be able to

i. locate and collect algae from various types of habitatsand scientifically identify them,
ii. cultivate (indoor and outdoor) andselect and importantcommercialalgae**,**
iii. utilize algae as inputs for industrial and farm applications,
iv. recognize and realize the potential of biotechnological approaches, and
v. find solutions by using algae in dealing with energy, environment and food crisis.

Unit 1: Diversity and Distribution of Algae

Types of algal habitat- Thallus organization with reference to cell structure and reproduction in various groups – *Anabaena, Spirulina* and*Kappaphycus*as model experimental systems.

Unit 2: Algal Collection and Identification

Methods of collection of micro and macro algae and their preservation - recent developments in algal taxonomy - trends in molecular phylogeny and inter relationship of principal groups of algae: Cyanophyta, Chlorophyta, Phaeophyta and Rhodophyta - Centers pursuing algal research in India

Unit 3: Industrial Phycology

Evaluation of resource potential - Source of food, feed and fodder, agro inputs, pigments, fine chemicals, fuel - Distribution of economically important algae - Products, processes and applications of seaweeds polysaccharides: agar, carrageenanand alginates - Bioactive compounds and therapeutic principles of algae - commercial uses of the following: *Spirulina, Chlorella, Gracilaria, Gelidium, Gelidiella, Kappaphycus, Laminaria* and *Porphyra.*

Unit 4: Algal Biotechnology

Culturing techniques - cryopreservation - *In situ & Ex situ* aquaculture (micro and macro algae) - Algal immobilization and its applications - indoor cultivation methods and scaling up - Measurement of algal growth – Remote sensing tool to locate and identify the algal groups - Large-scale cultivation of algae – Phycoremediation - Role of algae in nanobiotechnology.

Unit 5: Environmental and agricultural significance

Algal biofuels – algal biodiesel, bio-ethanol - Biological nitrogen fixation and hydrogen production – Fermentation and formulation development –SLF and seaweed extract (*Rhodophyllum*, *Kappaphycusalvarezii*, *Gracilaria*) liquid, gel, WS powder as bio-fertilizer – Algae in global warming – carbon sequestration.

Textbooks:

1. Isabella A. Abbott, George J. and Hollenberg. 1993. Marine Algae of California. Stanford,University Press. USA.
2. Sahoo D. and Qasim S.Z. (Editors), 2002.Sustainable Aquaculture.APH Publishing Corporation, New Delhi, India.
3. South G.R. and Whittick A. 1987. Introduction to Phycology.Blackwell Scientific Publications. London.
4. BARSANTI, LAURA AND PAOLO GUALTIERI 2005 Algae-Anatomy, Biochemistry and Biotechnology.Taylor& Francis, London, New York.
5. BECKER, E.W. 1994 Microalgae-Biotechnology and microbiology.Cambridge University 8. Press. CHANDRAMOHAN, D. 2007.
6. Prospects of Biodiesel from marine microorganisms. Proceedings of the National Workshop on BIODIESEL, Organised by School of Energy, Environment & Natural.
7. Resources, Madurai Kamaraj University, Madurai and Ahimsa Agri division, Chennai, 17th and 18th October, 2007.
8. TRIVEDI, P.C. 2001 Algal Biotechnology. Pointer publishers, Jaipur, India.VENKATARAMAN, L.V. AND E.W. BECKER 1985.
9. Biotechnology and Utilization of Algae – The Indian Experience. Dept. Science and Technology, New Delhi and Central Food Research Institute, Mysore, India.

References:

1. Andersen R.A. 2005. Algal Culturing Techniques.Physiological Society of America.Elsevier Academic Press, USA.
2. Lee R.E. 2008. Phycology (4thed.). Cambridge University Press, Cambridge.

Mapping of Course Outcomes with Bloom's Taxonomy

	K1	K2	K3	K4	K5	K6
CO1	4	5	4	3	0	0
CO2	4	4	4	2	2	0
CO3	4	4	5	3	3	3
CO4	4	4	4	4	4	4
CO5	4	4	5	4	4	4

Mean: 4.3

PGB 521V Plant Hybrid Technology 2 Hr./2 Cr.

Preamble:
The course introduces the basic knowledge of plant breeding, principles pertaining to plant breeding and crop improvement. Pre and Post Mendelian Era, the idea of inheritance transfer from one to next generation till now that is applied to studies. Basics of plant breeding and traditional methods in crop improvement will be discussed citing regional examples. Students should be able to understand the science of inheritance of characters and reasons behind the variations noticed in the new varieties. He should be able to appreciate the importance of plant resources in breeding, need to develop new hybrid varieties and preserve the plant species for the future generation.

At the end of the semester, students will be able to

i. acquire basic knowledge of plant breeding from the age before and afterMendelian era.
ii. analyse various methods in breeding to produce hybrid varieties.
iii. impart knowledge about the techniques of plant breeding to improve crop varieties.
iv. apply the knowledge of various breeding techniques to develop mass cultivation and commercial exploitation.
v. know the importance of various research centers located in Tamilnadu and its research activities.

Unit 1: Introduction (6 hr)
Principles and objectives – Concepts (classical and Post Mendalian Era) – significance of cross fertilization and wide cross – Heterosis and characteristics of hybrids .

Unit 2: Conventional Plant Breeding Methods (6 hr)
Self pollinated crops - Cross pollinated crops – Selection - Hybridization types - Procedure of hybridization - hybrid vigour.

Unit 3:Trends and techniques in Plant Breeding (6 hr)
Anther culture and its role in plant breeding - Production of haploid plant - Germplasmpreservation and enrichment techniques for hybrids – Gynogenesis method- Induced mutation – Molecular breeding.

Unit 4: Application and Utilization: (6 hr)
Tomato(Delaying Fruit Ripening) - Potato (Host Plant Resistance to Insects and Viruses) Onion (homozygotic lines) - Asexually propagated crops (banana, sugar cane, mango, citrus) coconut(early yielding) – Terminator Seed Technology – GMOs – Hybrid seed technology.

Unit 5: Leading Research Centers and their Contribution (6 hr)
Cotton breeding institute (Coimbatore) –Centre for Plant breeding and genetics (Millet Breeding Station - Coimbatore) - Tamil Nadu Rice Research Institute (Tanjore) - Coconut Research Station (TNAU, Aliyarnagar) - Institute of Forest Genetics and Tree Breeding (Coimbatore) - National Research Centre for Banana (Assam).

PGB 4

Textbooks:

1. S.K. Gupta and S.K (2005) Practical plant Breeding, Agrobios, India ISBN 9788177542400
2.Chahal ,G. S.Gosal S.S.(2002) Principles and procedures of plant breeding.Alpha science International Lts. UK.ISBN 9780849313219.

References:

1. Hayward,M.D, Bosemark,N.O, Romagosa,T(eds) Plant Breeding Principles and prospects Springer publication. ISBN 9780412433900
2. George Acquaah, (2012) Principles of plant genetics and breeding.2 ndedition.Wiley Blackwell Publishers. ISBN 9781118313695

Mapping of Course Outcomes with Bloom's Taxonomy

	K1	K2	K3	K4	K5	K6
CO1	4	5	4	3	2	4
CO2	5	4	5	4	4	4
CO3	4	4	4	4	3	4
CO4	4	5	5	4	4	4
CO5	3	3	3	5	4	3

Mean: 3.9