GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS) KUMBAKONAM

(Common course structure – B.Sc. – 2023 - 2024)

Department : Botany **Programme Code:USBO**

SEMESTER – I

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Credits
I	LC – I	U231T1	Tamil	6	3
II	ELC - I	U231E1	English	6	3
III	CC – I	U23BC- 101	Phycology	5	5
III	CC – II	U23BC-102P	Phycology-Practical	3	2
III	EC – I	U23ZGE1	Biology of Invertebrates and Chordates	4	4
III	EC – II	U23ZGE2P	Lab course in Biology of Invertebrates and Chordates - Practical	2	1
IV	VE	U231VE	Value education	2	2
IV	FC	U23V1FC	Basics of Botany	2	2
			Total	**30**	**22**

SEMESTER – II

Part	Course Type	Course Code	Title of the Course	Hrs/ Week	Credits
I	LC – II	U232T2	Tamil	6	3
II	ELC– II	U232E2	English	6	3
III	CC –III	U21BC-203	Fungi, Bacteria, Viruses, Plant Pathology and Lichens	5	5
III	CC - IV	U21BC- 204P	Fungi, Bacteria, Viruses, Plant Pathology and Lichens - Practical	3	2
III	EC - III	U23ZGE3	General principles of Zoology	4	4
	EC - IV	U23ZGE4	Lab course in General principles of Zoology	2	1
IV	SEC-I	U23B2S E1	Herbal Medicine	2	2
IV	EVS	U232ES	Environmental Studies	2	2
			Total	**30**	**22**

SEMESTER – III

Part	Course Type	Title of the Course	Hrs/ Week	Credits
I	LC – III	Tamil	6	3
II	ELC - III	English	6	3
III	CC – V	Bryophytes , Pteridophytes , Gymnospems and Paleobotony	6	6
III	CC – VI	Cryptogamous – Practical	3	2
III	EC – IV	Chemistry for Biological science 1	4	4
III	EC – V	Volumetric Analysis – Practical	2	1
IV	SEC - II	Mushroom Technology	1	1
IV	SEC - III	Global Climate Change	2	2
		Total	**30**	**22**

SEMESTER – IV

Part	Course Type	Title of the Course	Hrs/ Week	Credits
I	LC – IV	Tamil	6	3
II	ELC - IV	English	6	3
III	CC – VII	Plant Anatomy and Embryology	5	5
III	CC – VIII	Plant Anatomy and Embryology - Practical	3	2
III	EC – VI	Chemistry For Biological Science II	4	4
III	EC – VII	Systematic Analysis of organic compound	2	1
IV	SEC – IV	Fermentation Technology	2	2
IV	SEC - V	Environmental impact analysis	2	2
		Total	**30**	**22**

SEMESTER – V

Part	Course Type	Title of the Course	Hrs/ Week	Credits
III	CC – IX	Plant Morphology, Taxonomy and Economic Botany	6	5
III	CC – X	Cell Biology, Genetics and Plant Breeding	6	5
III	CC – XI	Systematic Botany and Cytogenetics – Practical	5	3
III	CC – XII	Project and Viva Voce	3	3
III	DSE – I	1. Medcinal Botany and Human welfare 2. Bio-Analytical Techniques	4	3
III	DSE – II	1. Plant Bioresources 2. Pomology 3.	4	3
IV	SEC – IV	Seed Biology	2	2
IV	AEC - I	Internship/Industrial training	-	2
		Total	**30**	**26**

SEMESTER – VI

Part	Course Type	Title of the Course	Hrs/ Week	Credits
III	CC – XIII	Ecology , Phytogeography and Biostatistics	5	5
III	CC – XIV	Plant Physiology, Biochemistry and Biotechnology	5	5
III	CC - XV	Physical and conservation Botany - Practical	6	3
III	DSE – III	1. Horticulture 2. Forestry	5	4
III	DSE - IV	1. Bionanotecnology 2. Forensic Botony 3.	4	3
IV	SEC – VII	Forestry	2	2
IV	AEC - II	Professional competency skill – General awareness for competitive examinations	2	2
IV	GS	Gender studies	1	1
	EA	Extension Activity	-	1
		Total	**30**	**26**

SEMESTER-I **CORE COURSE**

PHYCOLOGY

Theory Hours : 5	**Course Code :U23BC101**
Practical Hours :-	**Credit :5**
Exam Hours :3	**Mark :100**

OBJECTIVES

- To provide a comprehensive knowledge on the biology of algae.
- To provide a basis for better understanding of the evolution higher of plants.
- To understand reproductive biology, ecology of plants by studying the simpler systems in algae.
- To understand the role of algae in ecosystems as primary producers of nutrition.
- To understand importance of algae to animals and humans.

UNIT:I

Classification (Fritsch-1935-1945), criteria for classification, algal distribution.

UNIT:II

Thallus organization (unicellular-Chlorella, Diatoms, colonial-Volvox, filamentous-Anabaena, Oedogonium, siphonous-Caulerpa, parenchymatous- Sargassum, Gracilaria).

UNIT:III

Reproduction-Vegetative, asexual, sexual reproduction and life histories (haplontic-, Oedogonium and Chara, diplontic-Diatoms and Sargassum, diplohaplontic-Ulva and diplobiontic-Gracilaria) (Examples may be changed according to the availability of the specimens).

UNIT:IV

Algal cultivation methods, Algal production systems; indoor cultivation methods and large-scale cultivation of algae, harvesting of algae.

UNIT:V

Algae as food and feed: Agar-agar, Alginic acid and Carrageenan; Diatomite. Resource potential of algae: Application of algae as fuel, agriculture and pharmaceutical. Phycoremediation. Role of algae in CO_2 sequestration, Algae as indicator of water pollution, algal bioinoculants, Bioluminescence.

LEARNING OUTCOMES:

1. Relate to the structural organization, reproduction and significance of algae.
2. Demonstrate knowledge in understanding the various life cycle patterns and the fundamental concepts in algal growth
3. Explain the benefits of various algal technologies on the ecosystem.
4. Compare and contrast the thallus organization and modes of reproduction in algae.
5. Determine the emerging areas of Algal Biotechnology for identifying commercial potentials of algal products and their uses.

REFERENCE:

1. Aziz, F and Rasheed, R. 2019. A Course Book of Algae. Publisher: University of Sulaimani.ISBN: 978-9922-20-391-1.
2. Mihir Kumar, D. 2010. Algal Biotechnology. Daya Publishing House, New Delhi.
3. Chapman V.J. and Chapman D.J, 2013. The Algae. Alpha Numera.
4. Fritsch, F.E. 1945. Structure and reproduction of Algae. Cambridge University press.
5. Round, FE. 1984.The Ecology of Algae. Cambridge University Press.
6. Lee, R.D. 2008.Phycology 4th Edition, Cambridge University Press, New York.
7. Bold, H.C and Wynne, M.J. 1978. Introduction to the Algae: Structure and Function. Prantice Hall of India New Delhi.

MAPPING WITH PROGRAMME OUTCOMES:

COs	PO1	PO2	PO3	PO4	PO5	PSO6	PSO7	PSO8	PSO9	PSO10
CO1	3	3	1	3	2	1	2	2	2	1
CO2	3	3	2	2	3	3	2	`1	3	3
CO3	2	2	1	1	2	2	1	3	2	2
CO4	3	3	3	3	3	2	3	3	3	2
CO5	3	3	2	3	2	3	3	3	2	3

S-Strong (3) **M-Medium (2)** **L-Low(1)**

SEMESTER-I **CORE COURSE**

PHYCOLOGY - PRACTICAL-I

Theory Hours	**Course Code :U23BGE2P**
Practical Hours: 3	**Credit:2**
Exam Hours:3	**Mark :100**

OBJECTIVE

- To develop skills to identify algae based on habitat, thallus structure and the internal organization.
- To identify microalgae in a mixture.
- To develop skills to prepare the microslides of algae.
- To study the economic importance of few species.
- To understand importance of algae to animals and humans

EXPERIMENTS

1. Micro-preparation of the types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identifying types of algal mixture.
4. Economic importance of Algae as: (i) Food (ii) Feed (iii) Biofertilizers (iv) Seaweed liquid fertilizer (v) Hydrogen production by algae (vi) SCP (vii) Agar Agar (viii) Alginate (ix) Diatomaceous earth.
5. Field visit to study fresh water/marine water algal habitats.
6. Visit to nearby industry actively engaged in algal technology.

LEARNING OUTCOMES:

1. CO1 Recall and identify algae using key identification characters.
2. CO2 Demonstrate practical skills in preparation of fresh mount and identification of algal forms from algal mixture.
3. CO3 Describe the internal structure of algae prescribed in the syllabus
4. CO4 Decipher the algal diversity in fresh/marine water and their economic significance.
5. CO5 Evaluate the various techniques used to culture algae for commercial purposes

REFERENCE:

1. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying
2. Manual to algae identification field guide, Ottawa Agriculture and Agri food Canada publisher.
3. Chapman, V.J and Chapaman, D.J. 1960.The Algae, ELBS & MacMillan, London.
4. Lee, R.D. 2008.Phycology 4th Edition, Cambridge University Press, New York.
5. Dehradun. Edwardlee,R.2018. Phycology,5thEd.,CambridgeUniversityPress, London.

MAPPING WITH PROGRAMME OUTCOMES:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	1	2	3	2	1
CO2	3	3	2	2	3	3	2	3	3	3
CO3	2	2	3	3	1	2	1	3	1	2
CO4	3	3	3	3	3	2	3	3	3	2
CO5	3	3	2	2	2	3	3	3	2	3

S-Strong (3) **M-Medium (2)** **L-Low(1)**

SEMESTER-I **CORE COURSE**

CRYPTOGAMOUS BOTANY-I

Theory Hours : 2	**Course Code :U23BGE1**
Practical Hours :	**Credit:2**
Exam Hours :3	**Mark:100**

OBJECTIVES

- To study morphological and anatomical adaptations of plants of various habitats.
- To demonstrate techniques of plant tissue culture.
- To familiarize with the structure of DNA, RNA.
- To carryout experiments related with plant physiology.
- To perform biochemistry experiments.

UNIT-I Algae

General characters of algae - Structure, reproduction and life cycle of the following genera - Anabaena and Sargassum and economic importance of algae.

UNIT-II Fungi, Bacteria and Virus

General characters of fungi, structure, reproduction and life cycle of the following genera - Penicillium and Agaricus and economic importance of fungi. Bacteria - general characters, structure and reproduction of Escherichia coli and economic importance of bacteria. Virus - general characters, structure of TMV, structure of bacteriophage.

UNIT-III Bryophytes, Pteridophytes and Gymnosperms

General characters of Bryophytes, Structure and life cycle of Funaria. General characters of Pteridophytes, Structure and life cycle of Lycopodium. General characters of Gymnosperms, Structure and life cycle of Cycas.

UNIT-IV Morphology of Flowering Plants:

Plant and its parts. Structure and function of root and stem. Leaf and its parts. Leaf types- simple and compound. Phyllotaxy and types. Inflorescence - Racemose, Cymose and Special types. Terminology with reference to flower description.

UNIT-V Taxonomy:

Study of the range of characters and plants of economic importance in the following families: Rutaceae, Caesalpiniaceae, Asclepiadaceae, Euphorbiaceae and Cannaceae

LEARNING OUTCOMES:

1. Increase the awareness and appreciation of human friendly algae and their economic importance.
2. Develop an understanding of microbes and fungi and appreciate their adaptive strategies
3. Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.
4. Compare the structure and function of cells and explain the development of cells.
5. Understand the core concepts and fundamentals of plant biotechnology and genetic engineering.

REFERENCE

1. Parihar, N.S. 2012. An introduction to Embryophyta –Pteridophytes - Surjeet Publications, Delhi.
2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd.
3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand &Company Ltd, Delhi.
4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi.
5. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi.
6. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi.
7. Pandey B.P. 1986, Text Book of Botany (College Botany) Vol I &II, S.Chand and Co. New Delhi.

MAPPING WITH PROGRAMME OUTCOMES:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	3	3
CO4	3	3	2	3	3	3	2	3	2	3
CO5	3	2	2	2	2	2	2	1	2	1

S-Strong (3) **M-Medium (2)** **L-Low(1)**

SEMESTER-I **CORE COURSE**

LAB COURSE PRINCIPALES OF BOTANY PRACTICALS

Theory Hours :	**Course Code :U23BGE2P**
Practical Hours: 2	**Credit:2**
Exam Hours:3	**Mark :100**

OBJECTIVES

- To enhance information on the identification of each taxonomical group by developing the skill-based detection of the morphology and microstructure of microorganisms, algae, and fungi.
- To comprehend the fundamental concepts and methods used to identify Bryophytes, Pteridophytes and Gymnosperms through morphological changes and evolution, anatomy and reproduction.
- To be familiar with the basic concepts and principles of plant systematics.
- Understandingoflawsofinheritance,geneticbasisoflociand alleles.
- To learn about the physiological processes that underlie plant metabolism.

EXPERIMENTS

1. Make suitable micro preparation of the types prescribed in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
2. Micro photographs of the cell organelles ultra structure.
3. Simple genetic problems.
4. To describe in technical terms, plants belonging to any of the family prescribes and to identify the family.
5. To dissect a flower, construct floral diagram and write floral formula.
6. Demonstration experiments
   1. Ganong's Light screen
   2. Ganong's respiroscope
7. To make suitable micro preparations of anatomy materials prescribed in the syllabus.
8. Spotters - Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperm anatomy, Embryology, Cellbiology and Biotechnology.

LEARNING OUTCOMES

1. To study the internal organization of algae and fungi.
2. Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.
3. To study the classical taxonomy with reference to different parameters.
4. Understand the fundamental concepts of plant anatomy and embryology
5. To study the effect of various physical factors on photosynthesis.

REFERENCE

1. Strickberger, M.W. 2005. Genetics (III Ed). Prentice Hall, New Delhi, India.
2. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manualto algae identification field guide, Ottawa Agriculture and Agri food Canada publisher.
3. Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual forBryophytes and Pteridophytes. Lambert Academic Publishing.
4. Aler Gingauz.2001. MedicinalChemistry.OxfordUniversityPress&WileyPublications.
5. Steward, F.C. 2012. Plant Physiology Academic Press, US

MAPPING WITH PROGRAMME OUTCOMES:

COs	PO1	PO2	PO3	PO4	PO 5	PSO1	PSO2	PSO 3	PSO4	PSO 5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	1	3
CO4	3	3	2	3	3	3	3	2	3	3
CO5	3	2	2	2	2	2	2	1	2	2

S-Strong (3) **M-Medium (2)** **L-Low(1)**

SEMESTER-I **CORE COURSE**

BASICS OF BOTANY

Theory Hours : 2	**Course Code :U23B1FC**
Practical Hours :	**Credit:2**
Exam Hours :3	**Mark :100**

OBJECTIVES

- To learn about the classification, distinguishing traits, geographic distribution, and reproductive cycle of algae, fungi, lichens, and bryophytes.
- To understand the biodiversity by describing and explaining the morphology and reproductive processes of algae, fungi, bryophytes and microorganisms.
- To investigate the classification, distinctive traits, distribution and reproduction and life history of the various classes and major types of Pteridophytes and Gymnosperms.
- Enable to learn various cell structures and functions of prokaryotes and eukaryotes and understand the salient features and functions of cellular organelles.
- Understanding of laws of inheritance, genetic basis of loci and alleles.

UNIT-I Biodiversity

Systematics : Two Kingdom and Five Kingdom systems - Salient features of various Plant Groups : Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms - Viruses - Bacteria.

UNIT-II Cell Biology

Cell as the basic unit of life - Prokaryotic and Eukaryotic Cell (Plan Cell) - Light Microscope and Electron Microscope Ultra Structureof Prokaryotic and Eukaryotic Cells - Cell Wall - Cell Membrane Plastids, Ribosomes.

UNIT-III Plant Morphology

Structure and Modification of Root, Stem and Leaf - Structure and Types of Inflorescences - Structure and Types of Flowers, Fruits and Seeds**.**

UNIT-IV Genetics

Concept of Heredity and Variation - Mendel's Laws of Inheritance**.**

UNIT-V Plant Physiology

Cell as a Physiological Unit : Water relations -Absorption and movement : Diffusion, Osmosis, Plasmolysis, Imbibition -Permeability, Water Potential - Transpiration - Movement- Mineral Nutrition.

LEARNING OUTCOMES

1. Increase the awareness and appreciation of human friendly algae and their economic importance.
2. 2.Develop an understanding of microbes and fungi and appreciate their adaptive strategies
3. Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms
4. Compare the structure and function of cells and explain the development of cells.
5. Understand the core concepts and fundamentals of plant biotechnology and genetic engineering.

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2. Alexopoulos, C.J. 2013. Introduction to Mycology. Willey Eastern Pvt. Ltd.
3. Vashishta, P.C. 2014. Botany for Degree Students Gymnosperms. Chand & Company Ltd, Delhi.
4. Coulter, M. Jhon, 2014. Morphology of Gymnosperms. Surjeet Publications, Delhi.
5. Vashishta, P.C. 2014. Botany for Degree Students Algae. 2014. Chand & Company Ltd, Delhi.
6. Parihar, N.S. 2013. An introduction to Embryophyta –Bryophytes -, Surjeet Publications, Delhi.

MAPPING WITH PROGRAMME OUTCOMES:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	1	3
CO4	3	3	2	3	3	3	3	2	3	3
CO5	3	2	2	2	2	2	2	1	2	2

S-Strong (3) **M-Medium (2)** **L-Low (1)**

SEMESTER-II **CORECOURSE**

FUNGI, BACTERIA, VIRUSES, PLANTPATHOLOGY AND LICHENS

Theory Hours : 5	**Course Code :U21BC203**
Practical Hours :	**Credit 5**
Exam Hours :3	**Mark 100**

OBJECTIVES

- To describe the common characteristics of fungi as being heterotrophic, unicellular/multicellular.
- To understand the biology of fungi and to discuss the importance of fungi in various ecological roles
- To understand lichen structure, function, identification, and ecology; Comprehend the events of symbiosis and lichenization and to demonstrate the use of lichens as bioindicator species.
- To identify the main groups of plant pathogens, their symptoms.
- To understand the various types of plant diseases.

UNIT-I Fungi

Classification of fungi - (Alexopoulos and Mims, 1979), criteria for classification, Characteristic features, thallus organization, mode of nutrition, structure, reproduction and life-history of classes, each with one suitable example: Zygomycotina (Pilobolus, Mucor, Rhizopus), Ascomycotina (Aspergillus, Saccharomyces Peziza), Basidiomycotina (Agaricus, Pleurotus, Puccinia) and Deuteromycotina (Cercospora, Alternaria). (Examples may be changed according to the availability of the specimens). Importance of mycorrhizal association.

UNIT-II Economic Importance of Fungi

Cultivation of mushroom – Pleurotus (food). Fungi in agriculture application (biofertilizers): Mycotoxins (biopesticides), Production of industrially important products from fungi- alcohol (ethanol), organic acids (citric acid), enzymes (protease). Vitamins (Vitamin B-complex and Vitamin B-12), applications of fungi in pharmaceutical products (Penicillin). Importance of VAM fungi. Harmful effects of Fungi. Agriculture (Biofertilizers); Mycotoxins

UNIT-III Bacteria, Virus

Classification (Bergey's, 1994), structure and reproduction of bacteria, Mycoplasma, Virology -Viruses general characters, structure and reproduction.

UNIT-IV Plant Pathology

General symptoms of plant diseases; Geographical distribution of diseases; Etiology; Host- Pathogen relationships; Disease cycle and environmental relation; prevention and control of the following plant diseases. General characters of Bacteria and Viruses.

Bacterial diseases – Citrus canker and Bacterial wilt of Banana **Viral diseases** – Tobacco Mosaic and Vein clearing of Papaya **Fungal diseases** – Blast disease in rice and Tikka disease

UNIT-V Lichen

Classification (Hale, 1969). Habitat, nature of association, Structure, Nature of Mycobionts and Phycobionts, Study of growth forms of lichens (crustose, foliose and fruticose), types, distribution, thallus organization, reproduction and ecological significance of lichens with special reference to Usnea.

Economic importance of Lichens: food, fodder and nutrition, flavor, tanning and dyeing, cosmetics and perfumes, Brewing and distillation, minerals, Natural products, medicine (Ayurvedic, Siddha), pharmaceutical products, biodegradation agent, air pollution and bio monitoring, soil formation, nitrogen fixation, Harmful aspects, poison from lichens.

LEARNING OUTCOMES

1. Recognize the general characteristics of microbes, fungi and lichens and disease symptoms.
2. Develop an understanding of microbes, fungi and lichens and appreciate their adaptive strategies based on structural organization.
3. Identify the common plant diseases, according to geographical locations and device control measures.
4. Analyze the emerging trends in fungal biotechnology with special reference to agricultural and pharmaceutical applications.
5. Determine the economic importance of microbes, fungi and lichens.

REFERENCE BOOKS

1. Alexopoulos, C.J., Mims, C.W., Blackwell, M. 1996. Introductory Mycology. 4th edition. John Wiley & Sons (Asia) Singapore.
2. Webster, J and Weber, R. 2007. Introduction to Fungi. 3rd edition. Cambridge University Press, Cambridge.
3. Sharma, O.P. 2011. Fungi and allied microbes The McGraw –Hill companies, New Delhi.
4. Burnett, J.H. 1971.The fundamentals of Mycology. ELBS Publication, London.
5. Bessey, E.A. 1979. Morphology and Taxonomy of fungi, Vikas publishing House Pvt. Ltd, New Delhi.
6. Dharani Dhar Awasthi. 2000. A Handbook of Lichens Vedams eBooks (P) Ltd. New Delhi.
7. Pelzer, M.J., Chan, E.C.S and Krieg, N.R. 1983. Microbiology , Tata MaGraw Hill Publishing House, New Delhi.
8. Pandey, P.B. 2014. College Botany- 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi.
9. Mishra, A. and Agarwal, R.P. 1978. Lichens – A Preliminary Text. Oxford and IBH.
10. Pandey, B.P. 2005. College Botany I: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. S Chand & Company.

MAPPING WITH PROGRAMME OUTCOMES:

COs	COs	PO1	PO2	PO3	PO4	PO 5	PSO1	PSO 2	PSO3	PSO4
CO1	3	3	1	3	2	1	2	2	2	2
CO2	3	3	2	2	3	3	2	1	2	1
CO3	2	2	3	3	1	2	1	3	1	3
CO4	3	3	3	3	3	2	3	3	3	3
CO5	3	3	2	3	2	3	3	3	3	3

S-Strong (3) M-Medium (2) L-Low(1)

FUNGI, BACTERIA, VIRUSES, PATHOLOGY AND LICHENS - PRACTICAL-II

Theory Hours :	**Course Code :U21BC204P**
Practical Hours:	**Credit:2**
Exam Hours :3	**Mark:100**

OBJECTIVES

- To enable students to identify microscopic and macroscopic fungi.
- To prepare microslides of fungi and lichens.
- To know the presence of pathogen inside the plant tissues through microscopic sections.
- To identify the bryophytes based on the morphology, and microslides.
- To know the economic importance of the microbes studied.

EXPERIMENTS

1. Microscopic observation of vegetative and reproductive structures of types prescribed in the syllabus through temporary preparations and permanent slides.
2. Identifying the micro slides relevant to the syllabus.
3. Herbarium specimens of bacterial diseases/photograph.
3. Protocol for mushroom cultivation.
4. Inoculation techniques for fungal culture (Demonstration only).
5. Study of economically important products obtained from fungi: Fungal biofertilizers, biopesticides, biofungicide (*Trichoderma*),edible mushroom/Yeast,organic acids (citric acid) enzymes (protease), antibiotics and vitamins.
6. Mycorrhiza: ecto-mycorrhiza and endo-mycorrhiza (Photographs)
7. Visit to fungal biotechnology laboratories.
8. Ultrasturcture of bacteria.
9. Structure of bacteriophage.
10. Micro-preparation of *Usnea* to study vegetative and reproductive structures.
11. Identifying the micro slides relevant to the syllabus.
12. Study of thallus and reproductive structures (apothecium) through permanent slides.
13. Economic importance of Lichens - Dye and perfume.

LEARNING OUTCOMES:

1. Identify microbes, fungi and lichens using key identifying characters
2. Develop practical skills for culturing and cultivation of fungi.
3. Identify and select suitable control measures for the common plant diseases.
4. Analyze the characteristics of microbes, fungi and plant pathogens
5. Access the useful role of fungi in agriculture and pharmaceutical industry.

REFERENCE BOOKS

1. Alexopoulos,JandMims,W.1985 . IntroductoryMycology,Wiley Eastern Limited NewDelhi.
2. Bendre,M.AshokandAshokKumar,A. 2020.TextBookofPracticalBotany 1 (10th ed). RastogiPublications, Meerut.
3. Singh, R and U.C. Singh 2020. Modern mushroom cultivation, 3d Edition Agrobios(India), Jodhpur.
4. Poonam Singh and Ashok Pandey. 2009. Biotechnology for agro-Industrial residues utilization. Springer.
5. Satyanarayana T and Johri B.N. 2005. Microbial diversity, Current Perspectives and Potential Applications, IK International.

MAPPING WITH PROGRAMME OUTCOMES:

COs	COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	3	2	1	2	2	2	1
CO2	2	3	2	2	3	3	2	3	3	3
CO3	2	2	3	3	1	2	1	3	1	2
CO4	3	3	3	3	3	2	3	3	3	2
CO5	3	3	2	3	2	3	3	3	2	3

S-Strong (3) **M-Medium (2)** **L-Low(1)**

SEMESTER-II **CORE COURSE**

GENERAL PRINCIPLES OF BOTANY

Theory Hours : 4	**Course Code : U23BGE3**
Practical Hours:	**Credit:4**
Exam Hours :3	**Mark:100**

OBJECTIVES

- To be familiar with the basic concepts and principles of plant systematics.
- Learn the importance of plant anatomy in plant production systems.
- Understand the mechanism underling the shift from vegetative to reproductive phase.
- To learn about the physiological processes that underlie plant metabolism.
- To know the energy production and its utilization in plants.

UNIT-I Cell Biology

Prokaryotic and Eukaryotic cell- structure /organization. Cell organelles - ultra structure and function of chloroplast, mitochondria and nucleus. Cell division - mitosis and meiosis.

UNIT-II Genetics and Plant Biotechnology

Mendelism - Law of dominance, Law of segregation, Incomplete dominance. Law ofindependent assortment. Monohybrid and dihybrid cross - Test cross - Back cross. Plant tissue culture - In vitro culture methods. Plant tissue culture and its application in biotechnology.

UNIT-III Anatomy

Tissue and tissue systems: Simple and complex tissues. Anatomy of monocot and dicot roots - anatomy of monocot and dicot stems - anatomy of dicot and monocot leaves.

UNIT-IV Embryology

Structure of mature anther and ovule - Types of ovules, structure of embryo sac, pollination - double fertilization, structure of dicotyledonous and monocotyledonous seeds.

UNIT-V Plant Physiology

Absorption of water, photosynthesis - light reaction - Calvin cycle; respiration - Glycolysis - Krebs cycle - electron transport system. Growth hormones - auxins and cytokinins and their applications.

UNIT-IV Cell Biology

Prokaryotic and Eukaryotic cell- structure /organization. Cell organelles - ultra structure and function of chloroplast, mitochondria and nucleus. Cell division - mitosis and meiosis.

UNIT-V Genetics and Plant Biotechnology

Mendelism - Law of dominance, Law of segregation, Incomplete dominance. Law ofindependent assortment. Monohybrid and dihybrid cross - Test cross - Back cross. Plant tissue culture - In vitro culture methods. Plant tissue culture and its application in biotechnology.

LEARNING OUTCOMES

1. Understand the fundamental concepts of plant anatomy and embryology.
2. Analyze and recognize the different organs of plants and secondary growth.
3. Understand water relation of plants with respect to various physiological processes
4. Classify aerobic and anaerobic respiration.
5. Classify plant systematics and recognize the importance of herbarium and virtual herbarium.

REFERENCE

1. Lawrence.G.H.M. 1985. An Introduction to Plant Taxonomy, Central Book Depot, Allahabad.
2. Bhojwani, S.S and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi.
3. Pandey, B.P. 2012. Plant Anatomy. S Chand Publishing.
4. Jain, VK. 2006. Fundamentals of Plant Physiology, S. Chand and Company Ltd.
5. Rajni Gupta. 2012. Plant Taxonomy: Past, Present and Future. Vedams (P) Ltd. New Delhi.
6. Jain, V.K. 2006. Fundamentals of Plant Physiology, S.Chand and Company Ltd., New Delhi.
7. Verma, S.K. 2006. A Textbook of Plant Physiology, S.K.Chand & Co., New Delhi.

MAPPING WITH PROGRAMME OUTCOMES:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	3	3
CO4	3	3	2	3	3	3	3	2	3	2
CO5	3	2	2	2	2	2	2	1	2	2

S-Strong (3) **M-Medium (2)** **L-Low(1)**

SEMESTER-II **CORE COURSE**

LAB COURSE PRINCIPALES OF BOTANY PRACTICALS

Theory Hours :	**Course Code :U23PGE4P**
Practical Hours :2	**Credit 2**
Exam Hours :3	**Mark 100**

OBJECTIVES

- To enhance information on the identification of each taxonomical group by developing the skill-based detection of the morphology and microstructure of microorganisms, algae, and fungi.
- To comprehend the fundamental concepts and methods used to identify Bryophytes, Pteridophytes and Gymnosperms through morphological changes and evolution, anatomy and reproduction.
- To be familiar with the basic concepts and principles of plant systematics.
- Understandingoflawsofinheritance,geneticbasisoflociand alleles.
- To learn about the physiological processes that underlie plant metabolism.

EXPERIMENTS

7. Make suitable micro preparation of the types prescribed in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
8. Micro photographs of the cell organelles ultra structure.
9. Simple genetic problems.
10. To describe in technical terms, plants belonging to any of the family prescribes and to identify the family.
11. To dissect a flower, construct floral diagram and write floral formula.
12. Demonstration experiments
    1. Ganong's Light screen
    2. Ganong's respiroscope

7. To make suitable micro preparations of anatomy materials prescribed in the syllabus.
8. Spotters - Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms and Angiosperm anatomy, Embryology, Cellbiology and Biotechnology.

LEARNING OUTCOMES

6. To study the internal organization of algae and fungi.
7. Develop critical understanding on morphology, anatomy and reproduction ofBryophytes, Pteridophytes and Gymnosperms.
8. To study the classical taxonomy with reference to different parameters.
9. Understand the fundamental concepts of plant anatomy and embryology
10. To study the effect of various physical factors on photosynthesis.

REFERENCE

6. Strickberger, M.W. 2005. Genetics (III Ed). Prentice Hall, New Delhi, India.
7. Nancy Serediak and M. Huynh. 2011. Algae identification lab Guide. Accompanying manualto algae identification field guide, Ottawa Agriculture and Agri food Canada publisher.
8. Mohammed Gufran Khan, Shite Gatew and Bedilu Bekele. 2012. Practical manual forBryophytes and Pteridophytes. Lambert Academic Publishing.
9. Aler Gingauz.2001. MedicinalChemistry.OxfordUniversityPress&WileyPublications.
10. Steward, F.C. 2012. Plant Physiology Academic Press, US

MAPPINGWITHPROGRAMMEOUTCOMES:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	2	3	3	3	3	1	3	3	1	3
CO4	3	3	2	3	3	3	3	2	3	3
CO5	3	2	2	2	2	2	2	1	2	2

S-Strong (3) **M-Medium (2)** **L-Low(1)**

SEMESTER-II **CORE COURSE**

HERBAL MEDICINE

Theory Hours : 2	**Course Code :U23B2SE1**
Practical Hours :	**Credit 2**
Exam Hours :3	**Mark 100**

OBJECTIVES

- To understand the nuances of medicinal plants and their phytoconstituents of commercial value
- To design and develop medicinal garden.
- To apply the knowledge to cultivate medical plants.
- To know the pharmacological importance of medicinal plants.
- To enlist phytochemicals and secondary metabolites of market and commercial value.

UNIT-I

Importance and Relevance of Herbal drugs in Indian System of Medicine, Pharmacognosy – Aim and scope.

UNIT-II

Medicinal gardening – Gardens in the Hills and plains; House gardens; plants for gardening – Poisonous plants – Types of plant poison; action of poisons; treatment for poisons, some poisonous plants; their toxicity and action.

UNIT-III

Adulteration of crude drugs and its detection – methods of adulteration; types of adulteration. Medicinal plants of export values; rejuvenating herbs; Medicinal uses of Non-flowering plants.

UNIT-IV

Botanical description and active principles of Root drugs; Rhizomes woods and bark drugs (Two examples for each plant organs).

UNIT-V

Botanical description and active principles of leaves; Flowers; Fruits seed and entire plants as drugs. Taxonomic study of some selected herbals (Two examples for each plant organs)

LEARNING OUTCOMES:

1. Define and describe the principle of cultivation of herbal products.
2. Explain about the photochemistry of economically important medicinal herbs
3. Apply techniques for evaluation of drug adulteration through biological testing.
4. Formulate the value added processing / storage / quality control for the better use of herbal medicine.
5. Develop the skills for cultivation of plants and their value added processing/storage/quality control.

REFERENCE

1. Nair, N.C and Henrry, A.N. 1983, Flora of Tamil Nadu, India, Botanical Survey of India.
2. Chopra, R.N., Nagar S.L., and Chopra, I.C. 1956, Glossary of Indian Medicinal Plants.
3. Chopra, R.N., Chopra, I.C., Handa, K.L., and Kapur L.D., 1994, Indigenous drugs of India.
4. Chopra, R.N., Badhuvar R.L and Gosh, G. 1965. Poisonous plants in India.
5. Miller, L and Miller, B. 2017. Ayurveda & Aromatherapy: The Earth Essential Guide to Ancient Wisdom and Modern Healing. *Motilal Banarsidass*, *Fourth edition.*
6. Patri, F and Silano, V. 2002. Plants in cosmetics: Plants and plant preparations used as ingredients for cosmetic products - Volume 1. ISBN 978-92-871-8474-0, pp 218.

MAPPING WITH PROGRAMME OUTCOMES:

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	1	2	1	3	2	1
CO2	3	3	2	1	1	2	2	2	2	2
CO3	2	2	1	3	1	2	1	3	2	1
CO4	3	2	1	2	1	2	3	3	2	3
CO5	3	3	2	2	1	1	3	3	1	3

S-Strong (3) **M-Medium (2)** **L-Low(1)**