



SOMAIYA
V I D Y A V I H A R

K J Somaiya College of Science & Commerce

Department: Botany



T R U S T

F. Y. B.Sc. Syllabus

**K. J. Somaiya College of Science and Commerce,
Vidyavihar, Mumbai-400077
Autonomous - Affiliated to University of Mumbai
(Re Accredited by NAAC with Grade A)**

Revised Syllabus for F.Y.B.Sc. (Autonomous)

**Semester I & II
Program: F.Y.B.Sc.
Course: BOTANY**

(To be Implemented from Academic Year 2018-19)



PREAMBLE

The revised syllabus will be effective from the academic year 2018-19. Autonomy has given us the opportunity to frame the syllabus with a blend of Classical and Applied Botany which will open an array of opportunities in Higher Studies. Autonomy has also helped to develop the Entrepreneurship skills, Research and Consultancy. It has been prepared keeping in view, the unique requirements of Botany students. The content caters to the current changing needs of the students, specifically the subjects on statistics and computation skills. In the syllabus, the learner is introduced to the Interdisciplinary approach of learning. The course contains new practical exercises so that the students get hands-on experiences on the latest techniques that are currently in use. To develop scientific attitudes to make students critical and curious and to enhance environmental consciousness.

SEMESTER I				
Course	Modules		Credit	L / Week
18USBO1 01	Course : Plant Diversity - I		02	
I	1	MICROBIOLOGY AND ALGAE		12
	2	FUNGI AND LICHENS		12
	3	BRYOPHYTA AND PTERIDOPHYTA		12
18USBO1 02	Course : Forms and Function		02	
II	1	GENETICS, BIOSTATISTICS AND BIOINFORMATICS		12
	2	ENVIRONMENTAL BOTANY		12
	3	PLANT BIOCHEMISTRY AND PHYSIOLOGY		12
SEMESTER II				
18USBO2 01	Course : Plant Diversity - II		02	
I	1	GYMNOSPERMS		12
	2	ANGIOSPERMS		12
	3	ANATOMY		12



18USBO2 02	Course: Applied Botany		02	
II	1	HORTICULTURE		12
	2	ETHNOBOTANY AND AESTHETIC BOTANY		12
	3	ORGANIC MANURES AND ORGANIC FARMING		12

SEMESTER I Course - I		
Code	Plant Diversity-I	Credits
18USBO 101		02
Module-I	<p align="center">MICROBIOLOGY AND ALGAE</p> <p>Learning Objectives-</p> <p>i. To draw and interpret the general structure of a prokaryotic cell.</p> <p>ii.To give a comparative account of prokaryotic and eukaryotic cells.</p> <p>iii.To infer the general characteristics of division Algae.</p> <p>Learning Outcome – Students will be able to</p> <p>i.Draw and explain the internal structure of prokaryotic cells.</p> <p>ii.Classify the bacteria based on their mode of nutrition.</p> <p>iii.Analyse the different stages of life cycle in algae.</p> <p>iv.Justify the use of algae in several industries.</p>	Lectures 12
	<p>1. Bacteria –</p> <p>1.1.1 General introduction to living world</p> <p>1.1.2 Size, Shape, Reproduction (Binary fission, endospore formation, Conjugation)</p> <p>1.1.3 Ultrastructure of bacterial cell</p> <p>1.1.4 Economic importance of bacteria</p> <p>1.1.5 Classification of Bacteria based on mode of nutrition</p>	
	<p>1. Algae –</p> <p>2</p> <p>1.2.1 General characters of group Algae.</p> <p>1.2.2 Structure, systematic position and life cycle of <i>Zygnema</i></p> <p>1.2.3 Role of Algae (Food, Fodder, Industrial utilization and pollution indicators)</p>	
Module II	<p align="center">FUNGI AND LICHENS</p> <p>Learning Objectives -</p>	Lectures 12

	<p>i.To outline the distinguishing features of division fungi.</p> <p>ii.To recognize the significance of lichens.</p> <p>Learning Outcome– students will be able to</p> <p>i.Analyse the different stages of life cycle in fungi.</p> <p>ii.Justify the use of fungi and lichens in several industries.</p>	
	<p>2. FUNGI</p> <p>1</p> <p>2.1.1 General characters of group Fungi.</p> <p>2.1.2 General characters-Vegetative structure, Reproduction – Phycomycetes</p> <p>2.1.3 Structure, systematic position and life cycle of – <i>Rhizopus</i></p> <p>2.1.4 Nutrition in fungi</p> <p>2.1.5 Positive and Negative Applications of fungi (Industrial – flavour and texture, pharmaceutical, Agriculture, Mycotoxins)</p>	
	<p>2. LICHENS</p> <p>2</p> <p>2.2.1 Occurrence, Types, Thallus structure(homoiomerous and heteromerous)</p> <p>2.2.2 Reproduction in lichens.</p> <p>2.2.3 Ecological significance and economic importance of lichens</p>	
Module III	<p align="center">BRYOPHYTA AND PTERIDOPHYTA</p> <p>Learning Objectives -</p> <p>i.To record the distinguishing features of division Bryophyta and Pteridophyta.</p> <p>ii.To identify major groups of organisms with emphasis on plants and be able to classify with phylogeny.</p> <p>Learning Outcome – Students will be able to-</p> <p>i.Draw and analyse different stages of life cycle in Bryophytes and Pteridophytes.</p>	Lectures 12
	<p>3. BRYOPHYTA</p> <p>1</p> <p>3.1.1 General characters of group Bryophyta.</p> <p>3.1.2 Structure, systematic position and life cycle of <i>Riccia</i></p>	



	3. 2	PTERIDOPHYTA 3.2.1 General characters of group Pteridophyta. 3.2.2 Characteristics of Pteridophytes suitable to land habit. 3.2.3 Structure, systematic position and life cycle of <i>Nephrolepis</i>	



Suggested Reading		
Sr. No.	Title	Author
Algae		
1	Botany for Degree Students	B. R. vasistha
2	Cryptogamic Botany Vol. I	G. M. Smith
3	Textbook of Algae	O .P Sharma
4	College Botany	Gangulee&Kar
Fungi		
1	Textbook of Fungi	O. P. Sharma
2	An Introduction of Fungi	H. C. Dubey
3	Botany for Degree Students	B. R. vasistha
4	Textbook of Mycology	A.K. Sarbhoy
5	College Botany	Gangulee&Kar
Bryophyta		
1	Botany for Degree Students	B. R. vasistha
2	Cryptogamic Botany Vol. I	G. M. Smith
3	Textbook of Botany Vol.II	Saxena& Sarabhai
4	College Botany	Gangulee&kar
Pteridophyta		
1	Pteridophyta	P.C Vasistha
2	Comparative Morphology of Vascular plants	Foster & Gifford
3	Pteridophyta	O.P.Sharma
4	College Botany	Gangulee&Kar
Microbiology		
1	General Microbiology	Pelczar
2	General Microbiology	Kale &Bhusari
3	General Microbiology	Pawar&Daginawala

SEMESTER I Course II		
Forms and Function		
Code		Credits
18USBO 102		02
Module- I	<p align="center">GENETICS, BIOSTATISTICS AND BIOINFORMATICS</p> <p>Learning Objectives-</p> <p>i.To recognize the pattern of gene interaction</p> <p>ii.To cite the necessity of bioinformatics in organization of biological data.</p> <p>Learning Outcome – Students will be able to</p> <p>i.Interpret the genetic interaction.</p> <p>ii.Establish the relationship between gene expression and gene interaction.</p> <p>iii.Define the role of bioinformatics in agriculture and botanical field.</p>	Lectures 12
	<p>1.1 Introduction to Mendelian Genetics:</p> <p>1.1.1 Monohybrid cross</p> <p>1.1.2 Dihybrid cross</p> <p>1.1.3 Back and Test cross</p>	
	<p>1.2 Deviation of Mendelian Genetics</p> <p>1.2.1 Dominant Epistasis</p> <p>1.2.2 Recessive Epistasis</p> <p>1.2.3 Duplicate dominant Epistasis</p> <p>1.2.4 Duplicate recessive Epistasis</p> <p>1.2.5 Supplementary and complimentary genes</p>	

	1.	Bioinformatics: History, Aim and Scope, general terminologies used in bioinformatics.	
Module II		ENVIRONMENTAL BOTANY	Lecture 12
	2.1	Ecosystem: Structure, Functions and Types of ecosystems. Mangrove ecosystem	
	2.2	Concept of environmental factors 2.3.1 Light, 2.3.2 Temperature, 2.3.3 Precipitation	
	2.3	Consequences of Climate Change Case study of Malin Land Slide	
	2.4	2.5.1 Forestry – Introduction, Classification and Scope 2.5.2 Forest Research Education and Training Institutes	
Module-III		PLANT BIOCHEMISTRY AND PHYSIOLOGY Learning Objectives - i To acquire the structural and fundamentals of biomolecules. ii.To illustrate the mechanism of enzyme activity. iii.To predict the role of various plant growth regulators Learning Outcome – Students will be able to i. Draw and interpret the structure and function of various biomolecule ii. Predict the mechanism of enzyme action iii. Apply the required plant growth regulators to improve the yield in agriculture	Lectures 12
	3.1	Introduction of Biomolecules – 3.1.1 Water	



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		3.1.2 Carbohydrates 3.1.3 Proteins 3.1.4 Lipids	
	3.2	Enzymes – 3.3.1 Classification 3.3.2 Mechanism of Action 3.3.3 Inhibition	
	3.3	Plant Growth Regulators – Introduction and Applications with respect to agriculture	



Suggested Reading		
Cytogenetics		
1	iGenetics	Peter Russell
2	Genetics	P.K.Gupta
3	Genetics	A.M.Winchester
4	Principle of Genetics	Gardner
5	Problems on Genetics, Molecular Genetics & Evolutionary Genetics	P.K.Banerjee
6	Plant Breeding & Biometry	Karl Halder
7	Fundamentals of Genetics	B.D.Singh
Biostatistics		
1	Biostatistics	B.K.Mahajan
2	Biostatistics	Rastogi
3	Biostatistics	Arora
4	Biostatistics	S.Prasad
5	Biostatistics	KarHalder
Environmental Botany		
1	Ecology	P.Odum
2	Ecology & Environment	P.D.Sharma
3	Environmental science	M.H.Fulekar
Plant Physiology		
1	Plant Physiology	V. Verma
2	Modern Plant Physiology	R.K.Sinha
3	Plant Physiology	Kochhar
4	Medical Biochemistry	U.Satyanarayana
5	Biochemistry	V.Varma

SEMESTER I PRACTICAL I		
Code	Plant Diversity- I	Credits
18USBO1P1		02
		Practical
	Bacteria	
1	Simple staining – Positive Staining	1
	Study of motility in bacteria using hanging drop technique	
	Algae	1
2	Economic importance of algae	
3	Study of the following types with the help of fresh or preserved material / permanent slides / photomicrographs – <i>Nostoc, Zygnema</i>	2
	Fungi	
4	Study of the following types with the help of fresh or preserved material / permanent slides / photomicrographs – <i>Rhizopus, Albugo</i>	2
	Economic importance of Fungi	2
	Nutraceutical values of Edible Mushrooms.	
	Lichen	
5	Study of Thallus, Structure, Permanent slide of Internal Structure	1
	Ecological and Economic importance of lichens	1
	Bryophyta	
6	Study of the following types with the help of fresh or preserved material / permanent slides / photomicrographs – <i>Riccia</i>	1
	Pteridophyta	
7	Study of the following types with the help of fresh or preserved material / permanent slides / photomicrographs – <i>Nephrolepis</i>	
	Sections of Hydathode, Ramenta and Pinna passing through sori	1

SEMESTER I PRACTICAL II		
Code	Forms and Function	Credits
18USBO1P2		02
		Practical
1	Problems on Monohybrid, Dihybrid cross and Epistasis	1
2	Measures of Central Tendency; Mean, Median, Mode and standard deviation	1
3	Bioinformatics: Use of Internet – www, http, html	1
4	Study of Ecological Adaptations: Hydrophyte – <i>Hydrilla</i> (stem), Demonstration of <i>Pistia</i> and <i>Nymphaea</i> Xerophyte – <i>Opuntia</i> (Phylloclade), <i>Nerium</i> (Leaf-demonstration) Halophyte – <i>Avicennia</i> (Leaf), pneumatophore	1
5	Major and Minor Forest Products	1
6	Qualitative Tests for Sugar (Fehling's Test, Benedict's Test, Molisch Test)	1
7	Qualitative Tests for Proteins (Biuret Test, Ninhydrin Test)	1
8	Study of Activity of enzyme Amylase, pH variation, Substrate variation	3

SEMESTER II, Course I		
Plant Diversity- II		
Code		Credits
18USBO 201		02
Module I	<p align="center">GYMNOSPERMS</p> <p>Learning Objectives -</p> <p>i.To review the salient features of division gymnosperms.</p> <p>ii.To predict the potential use of gymnosperms in industry.</p> <p>Learning Outcome– students will be able to-</p> <p>i.Identify and classify the plants of division Gymnosperm</p> <p>ii.Draw and infer the various stages of life cycle in Gymnosperms</p>	Lectures 12
	<p>1.1 General characters of group Gymnosperm</p> <p>1.2 Comparison between gymnosperm and angiosperm.</p> <p>1.3 Characteristics of group cycadophyta and coniferophyta</p> <p>1.4 Structure, systematic position and life cycle of <i>Cycas</i>.</p> <p>Economic importance of gymnosperms</p>	
Module II	<p align="center">ANGIOSPERMS</p> <p>Learning Objective -</p> <p>i.To employ the morphological peculiarities to classify the plants to respective families.</p> <p>Learning Outcome – Students will be able to</p> <p>i.Classify the plants to respective families.</p> <p>ii.Predict the economic uses of plants belonging to a particular family.</p>	Lectures 12

	<p>2.1 Study of the following families according to Bentham and Hooker system of classification with special emphasis on morphological peculiarities and economic importance.</p> <p>2.1.1 Malvaceae</p> <p>2.1.2 Leguminosae (Papilionaceae, Caesalpiniaceae, Mimosae)</p> <p>2.1.3 Solanaceae</p> <p>2.1.4 Asteraceae</p> <p>2.1.5 Amaryllidaceae</p>	
ANATOMY		
Module III	<p>Learning Objectives -</p> <p>i. To differentiate the tissue organization.</p> <p>ii. To differentiate between monocot and Dicot plants based on internal structure.</p> <p>Learning Outcome– Students will be able to</p> <p>i. Draw the internal structure of monocot and dicot root and stem.</p>	Lectures 12
	<p>3.1 Tissue system in plants:</p> <p>3.1.1 Introduction to various tissue systems in plants</p> <p>3.1.2 Types of vascular bundles</p> <p>3.1.3 Stomata (dicot and monocot)</p> <p>3.2 Study of primary structure of –</p> <p>3.2.1 Dicot and Monocot root</p> <p>3.2.2 Dicot and Monocot stem</p>	

SEMESTER II Course II		
Applied Botany		
Code		Credits
18USBO 202		02
Module I:	<p align="center">HORTICULTURE</p> <p>Learning Objectives-</p> <p>i.To perform the various operations in the garden.</p> <p>ii.To set up a nursery</p> <p>iii.To practice the regular plantation to maintain the green cover.</p> <p>Learning Outcome – Students will be able to</p> <p>i.Set up own nursery</p> <p>ii.Perform various functions in garden for management.</p> <p>iii.Develop the green cover over available land.</p>	Lectures 12
	<p>1.1 Definition, Branches, Importance and Scope</p>	
	<p>1.2 Garden operations:</p> <p>1.2.1 Characteristics of fertile soil</p> <p>1.2.2 Soil preparation</p> <p>1.2.3 Digging and sowing</p> <p>1.2.4 Weed Management</p>	
	<p>1.3 Propagation Practices:</p> <p>1.3.1 Method of propagation by seed</p> <p>1.3.2 Cutting – Stem</p> <p>1.3.3 Layering – Simple</p> <p>1.3.4 Grafting – splice and whip</p>	

	1.3.5 Budding – T-budding	
Module II	<p align="center">ETHNOBOTANY AND AESTHETIC BOTANY</p> <p>Learning Objectives -</p> <p>i.To recognize the importance of traditional medicinal practices.</p> <p>ii.To implement the herbal cosmetics as effective therapeutic method.</p> <p>Learning Outcome – students will be able to</p> <p>i.Practice the herbal cosmetics for skin and hair care at initial stages.</p> <p>ii.Make effective use traditional medicinal systems.</p>	Lectures 12
	<p>2.1 <u>Herbal cosmetics-</u></p> <p>2.1.1 Cosmetics – Definition, Scope</p> <p>2.1.2 Herbal Cosmetics for Skin care –Types of skin, Structure of skin, Plants used in Skin care – Cucumber, Neem, Turmeric, Herbal formulations for skin care – Moisturiser, Face pack</p> <p>2.1.3 Herbal Cosmetics for Hair care - Structure of hair, Common hair problems</p> <p>Plants used in hair care –Maka, Jaswand, Aloe</p> <p>Herbal formulations for hair care –Oil, Gel</p>	
	<p>2.2 <u>Ethnobotany-</u></p> <p>2.2.1 Introduction, Concept, Importance, Conservation</p> <p>2.2.2 Methods of ethnobotanical Research</p> <p>2.2.3 Some plants of ethnobotanical importance</p>	
Module III	ORGANIC MANURES AND ORGANIC FARMING	Lectures

	<p>Learning Objectives -</p> <p>i.To compare the ill effects of excess use of chemical fertilizers.</p> <p>ii.To acquire the recent advances in farming practices. iii.To modify the existing formulations of fertilizers.</p> <p>Learning Outcome– students will be able to-</p> <p>i.Judge the effects of excess use of fertilizers.</p> <p>ii.Formulate the bio fertilizer.</p> <p>iii.Practice the organic farming for improved quality of food</p>	12
	<p>3.1 3.1.1 Organic manures -Introduction and importance</p> <p>3.1.2 Types of Organic Manures (Humus, Compost, Farm yard manure, Green manure)</p>	
	<p>3.2 Bio-fertilizers- Definition and importance</p> <p>3.2.1 Bacteria- <i>Rhizobium, Azotobacter</i></p> <p>3.2.2 Blue-green algae</p> <p>3.2.3 VAM</p>	
	<p>3.3 Organic Farming:</p> <p>3.3.1 Introduction and importance</p> <p>3.3.2 Advantages and disadvantages</p> <p>3.3.3 Case study</p>	

SEMESTER II PRACTICAL I		
Code	Plant Diversity- II	Credits
18USBO2P1		02
		Practical
Gymnosperms		
1	Study of the following types with the help of fresh or preserved material / permanent slides / photomicrographs – <i>Cycas</i> Mounting of Microsporophyll and pollen grains.	1
Angiosperms		
2	Study of Inflorescence- types	1
3	Study of floral morphology Calyx Petaloid, Pappus Corolla Tubular, Salver shaped, Bilabiate, Perianth Aestivation Valvate, Twisted, Imbricate, Vexillary Gynoecium Placentation – Marginal, Axile, Basal, Pendular, Parietal	
4	Study of the following families with the help of fresh material Malvaceae Leguminosae(Papilionaceae, Caesalpinaceae, Mimosae) Solanaceae Asteraceae Amaryllidaceae	6
Anatomy		
5	Study of types of vascular bundles with the help of permanent slides	1
6	Study of Stomata (dicot and monocot)	

7	Study of primary structure of Dicot root and Monocot root	1
8	Study of primary structure of Dicot stem and Monocot stem	1

SEMESTER II PRACTICAL II		
Code	Applied Botany	Credits
18USBO2P2		02
		Practical
1	Propagation Practices – By Seeds, Cutting – Stem, Layering – Simple, Grafting – splice/whip, Budding – T-budding	1
2	Study of Plants used in Skin care – Cucumber, Neem, Turmeric, <i>Aloe</i>	1
3	Preparation of Herbal formulations for skin care – Moisturiser, Face pack	1
4	Study of Plants used in hair care – Maka, Jaswand, Aloe	1
5	Preparation of Herbal formulations for hair care – Oil, Lotion and Gel	1
6	Study of Some plants of Ethnobotanical importance	1
7	Study of identification of Biofertilizers (<i>Rhizobium</i> , <i>Nostoc</i> , VAM)	1
8	Demonstration of Biocomposting	1