

Deccan Education Society's

Kirti M. Doongursee College of
Arts, Science and Commerce
(AUTONOMOUS)



Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for
Program: Bachelor of Science
Course: F.Y.B.SC.
Subject: Botany

Choice Based Credit System (CBCS)
with effect from
Academic Year 2022-2023

Course Code	Course Title	Credits	Lectures /Week
Semester I KUSBOT22101	Paper I- Plant Diversity 1	2	3
Course Objectives:			
<ul style="list-style-type: none"> To learn the salient features of major groups of algae viz. Chlorophyta and Cyanophyta with suitable examples. To study the economic importance of algae in general. To gain knowledge about fungi, their life cycle patterns and economic importance. To study plant group Class- Hepaticae from Bryophyta. 			
Unit			
	Topics		No of Lectures
I – ALGAE	1. Structure, life cycle and systematic position of <i>Nostoc</i> and <i>Spirogyra</i> .		15
	2. Economic importance of Algae.		
II - FUNGI	1. Structure, life cycle and systematic position of <i>Rhizopus</i> and <i>Aspergillus</i> .		15
	2. Economic importance of Fungi.		
	3. Modes of nutrition in Fungi (Saprophytism and Parasitism).		
III - BRYOPHYTA	1. General characters of Hepaticae.		15
	2. Structure, life cycle and systematic position of <i>Riccia</i> .		
Textbooks:			
<ul style="list-style-type: none"> A New Course in Botany by Dr. Vikas V. Golatkar, Dr. Behnaz B. Patel and Dr. Neeraja S. Tutakne. Sheth Publication. 			
Additional References:			
<ol style="list-style-type: none"> College Botany Volume I and II Gangulee, Das and Dutta latest edition. Central Education enterprises Cryptogamic Botany Volume I and II by G M Smith McGraw Hill. Book for Degree Students- Algae by B R Vasistha Book for Degree Students- Fungi by B R Vasistha Book for Degree Students- Bryophytes by B R Vasistha 			

Course Code	Course Title	Credits	Lectures /Week
Semester I KUSBOT22102	Paper II- Form and Function 1	2	3
Course Objectives:			
<ul style="list-style-type: none"> To understand plant cell, the structure and function of different cell organelles. To acquire information about basic concepts related to environmental landscape formations and functioning of different components of an ecosystem. To gain knowledge about hereditary phenomenon observed in nature and interactions of genetic crosses 			
Unit			
	Topics		No of Lectures
I - CELL BIOLOGY	1. General structure of plant cell: cell wall, Plasma membrane (bilayer lipid structure, fluid mosaic model)		15
	2. Ultra-structure and functions of the following cell organelles: Endoplasmic reticulum and Chloroplast		
II - ECOLOGY	1. Energy pyramids, energy flow in an ecosystem.		15
	2. Types of ecosystems: aquatic and terrestrial.		
III- GENETICS	1. Phenotype/Genotype, Mendelian Genetics- monohybrid, dihybrid; test cross; back cross ratios.		15
	2. Epistatic and non-epistatic interactions; multiple alleles.		
Textbooks:			
<ul style="list-style-type: none"> A New Course in Botany by Dr. Vikas V. Golatkar, Dr. Behnaz B. Patel and Dr. Neeraja S. Tutakne. Sheth Publication. 			
Additional References:			
<ol style="list-style-type: none"> Cell and Molecular Biology by De Robertis. Publisher- Walters Kluwer. Fundamentals of Ecology by E P Odum and G W Barrett. Thompson Asia Pvt Ltd. Singapore. Genetics by Russel. Wesley Longman inc publishers. (5th edition) Heredity. An introduction to Genetics by A. M. Winchester, Publication - Barnes and Noble 			

Course Code	Course Title	Credits	Lectures/ Week
Semester I KUSBOTP22101	Practical	1	3
Course Objectives: <ul style="list-style-type: none"> • Identification of algae and fungi by observing them under microscope. • Mounting and identification with the help of fresh/preserved material and permanent slides of Spirogyra and Nostoc-Vegetative and reproductive structures. • Economic importance of algae and fungi in general. • Microscopic observation, mounting and identification of fresh/preserved material and permanent slides of Rhizopus and Aspergillus. • Study of morphological features and internal structure of Riccia with help of fresh /preserved material and permanent slides. 			
PRACTICAL Paper I – Plant Diversity 1			
1	Study of stages in the life cycle of <i>Nostoc</i> from fresh/ preserved material and permanent slides.		
2	Study of stages in the life cycle of <i>Spirogyra</i> from fresh/ preserved material and permanent slides.		
3	Economic importance of algae: <i>Ulva</i> (Biofuel), <i>Spirulina</i> (Neutraceutical), <i>Gelidium</i> (Agar)		
4	Study of stages in the life cycle of <i>Rhizopus</i> from fresh/ preserved material and permanent slides.		
5	Study of stages in the life cycle of <i>Aspergillus</i> from fresh/ preserved material and permanent slides.		
6	Economic importance of Fungi: Mushroom, Yeast, wood rotting fungi (any bracket fungus).		
7	Study of stages in the life cycle of <i>Riccia</i> from fresh/ preserved material.		
8	Study of stages in the life cycle of <i>Riccia</i> with the help of permanent slides.		

Course Code	Course Title	Credits	Lectures/ Week
KUSBOTP22101	Practical	1	3
Course Objectives: <ul style="list-style-type: none"> • Squash preparation to study various stages of mitosis to learn the technique of chromosomal staining and observe the stages of cell division. • Slide preparation to study types of starch grains in potato and rice. Mounting of aleurone layer from maize grain. • Students would take transverse section of <i>Ficus elastica</i> leaf and observe under light microscope to understand cystolith similarly other mineral crystals like raphides and sphaeraphides. This would enable students to explore the diversity of cell inclusions and bio- mineralization in plants. • Cell organelles would be studied using photomicrographs. • Based on observations of morphological characters, plants would be identified as hydrophytes, mesophytes, xerophytes and halophytes. • Introduction to biostatistics, sampling, central tendency calculation of mean, median and mode and calculation of standard deviation. • Karyotype analysis of human- normal male and female. 			
PRACTICAL PAPER II- FORM AND FUNCTION 1			
1	Examining various stages of mitosis in root tip cells (<i>Allium</i>)		
2	Cell inclusions: Starch grains (Potato and Rice); Aleurone Layer (Maize)		
3	Cystolith (<i>Ficus</i>); Raphides (<i>Pistia</i>); Sphaeraphides (<i>Opuntia</i>).		
4	Identification of cell organelles with the help of photomicrograph: Plastids: Chloroplast, Amyloplast, Endoplasmic Reticulum and Nucleus		
5	Identification of plants adapted to different environmental conditions: Hydrophytes: Floating: Free floating (<i>Pistia/Eichornia</i>); Rooted floating (<i>Nymphaea</i>); Submerged (<i>Hydrilla</i>)		
6	Mesophytes (any common plant); Hygrophytes (<i>Typha/Cyperus</i>)		
7	Xerophytes : Succulent (<i>Opuntia</i>); Woody Xerophyte (<i>Nerium</i>); Halophyte (<i>Avicennia pneumatophore</i>) No sections in ecology, only identification and description of specimens. Morphological adaptations only.		
8	Calculation of mean, median and mode.		
9	Calculation of standard deviation.		
10	Frequency distribution, graphical representation of data- frequency polygon, histogram, pie chart.		
11	Study of Karyotypes: Human: Normal male and female, <i>Allium cepa</i> .		

Course Code	Course Title	Credits	Lectures /Week
Semester II KUSBOT22201	Paper I- Plant Diversity 1	2	3
About the Course:			
Course Objectives:			
<ul style="list-style-type: none"> To learn about life cycle pattern of ornamental plants-Ferns and their significance in evolution of plant life. To understand life cycle of living fossil plant and the economic importance of Gymnosperms. To gain knowledge about modifications and adaptations of plant organ leaf and patterns of arrangement of flowers. To illustrate particular type of flowering plants under specific broad classification group of plant family. 			
Paper I -- Plant Diversity 1			
Unit	Topics	No of Lectures	
I – PTERIDOPH YTES	Structure life cycle, systematic position and alternation of generations in <i>Nephrolepis</i>	15	
	Stelar evolution		
II - GYMNOSPE RMS	Structure life cycle systematic position and alternation of generations in <i>Cycas</i>	15	
	Economic importance of Gymnosperms		
III - ANGIOSPER MS	Leaf: simple leaf, types of compound leaves, Incisions of leaf, venation, phyllotaxy, types of stipules, leaf apex, leaf margin, leaf base, leaf shapes. Modifications of leaf: spine, tendril, hooks, phyllode, pitcher, <i>Drosera</i> or insectivorous plants.	15	
	Inflorescence: Racemose: simple raceme, spike, catkin, spadix, panicle. Cymose: monochasial, dichasial, polychasial. Compound: corymb, umbel, cyathium, capitulum, verticillaster, hypanthodium.		
	Study of following families: Malvaceae, Amaryllidaceae.		
Textbooks:			
<ul style="list-style-type: none"> A New Course in Botany by Dr. Vikas V. Golatkar, Dr. Behnaz B. Patel and Dr. Neeraja S. Tutakne. Sheth Publication. 			

Additional References:

1. Book for Degree Students- Pteridophyta by P C Vasistha (2010) S. Chand Delhi India.
2. Book for Degree Students- Gymnosperm by P C Vasistha (2010) S. Chand Delhi India.
3. College Botany Volume I and II Gangulee, Das and Dutta latest edition. Central Education enterprises

Course Code	Course Title	Credits	Lectures /Week
Semester II KUSBOT22202	Paper II- Form and Function 1	2	3
Course Objectives:			
<ul style="list-style-type: none"> • To understand the internal components and construction of various plant organs. • To gain knowledge about functional mechanisms of synthesis of food material by plants. • To analyze and apply the information about medicinal plants gained by simple observations related to common ailments, household remedies with traditional knowledge. 			
Unit			
	Topics	No of Lectures	
I - ANATOMY	Simple tissues, complex tissues.	15	
	Primary structure of dicot and monocot root, stem and leaf.		
	Epidermal tissue system: types of hair, monocot and dicot stomata.		
II - PHYSIOLOGY	Photosynthesis: Light reactions, photolysis of water, photophosphorylation (cyclic and non-cyclic), carbon fixation phase (C ₃ , C ₄ and CAM pathways).	15	
III- MEDICINAL BOTANY	Concept of primary and secondary metabolites, difference between primary and secondary metabolites.	15	
	Grandma's pouch: Following plants have to be studied with respect to botanical source, part of the plant used, active constituent's present and medicinal uses: <i>Oscimum sanctum</i> , <i>Adathoda vasica</i> , <i>Zinziber officinale</i> , <i>Curcuma longa</i> , <i>Santalum album</i> , <i>Aloe vera</i> .		
Textbooks:			
<ul style="list-style-type: none"> • A New Course in Botany by Dr. Vikas V. Golatkar, Dr. Behnaz B. Patel and Dr. 			

Neeraja S. Tutakne. Sheth Publication.

Additional References:

- 1. Plant Anatomy by B. P. Pandey, Publisher S. Chand**
2. Plant Physiology by Taiz and Zeiger Sinauer Associates inc. publishers
3. Introductory Plant physiology by Noggle and Fritz, publisher phi learning Pv. Ltd, New Delhi 1.

Course Code	Course Title	Credits	Lectures/ Week
Semester II KUSBOTP22201	Practical	1	3
Course Objectives:			
<ul style="list-style-type: none"> • Students would learn to observe specimens, identify with the help of morphological and anatomical characters. Learn the technique of sectioning and differentiate the tissues based on cell wall characteristics. Learn to observe different stages in the life cycle of <i>Nephrolepis</i> and <i>Cycas</i>. • Economic importance of Gymnosperms (<i>Pinus</i>). • Study of leaf, inflorescence and flower morphology. • An introduction to classification of flowering plants and study of families 1. Malvaceae 2. Amaryllidaceae. 			
PRACTICAL Paper I – Plant Diversity 1			
1	Study of stages in the life cycle of <i>Nephrolepis</i> : Mounting of ramentum, hydathode, T.S. of rachis.		
2	T.S. of pinna of <i>Nephrolepis</i> passing through sorus.		
3	Stelar evolution with the help of permanent slides: Protostele: haplostele, actinostele, plectostele, mixed protostele, Siphonostele: ectophloic, amphiphloic, dictyostele, eustele and atactostele.		
4	<i>Cycas</i> : T.S of leaflet (<i>Cycas</i> pinna)		
5	Megasporophyll, microsporophyll, coralloid root, microspore, L.S. of ovule of <i>Cycas</i> – all specimens to be shown.		
6	Economic importance of Gymnosperms: <i>Pinus</i> (turpentine, wood, seeds)		
7	Leaf morphology : as per theory		
8	Types of inflorescence: as per theory		
9	Malvaceae		
10	Amaryllidaceae		

Course Code	Course Title	Credits	Lectures/ Week
Semester II KUSBOTP22201	Practical	1	3
Course Objectives:			
<ul style="list-style-type: none"> Sectioning of dicot and monocot root, stem and leaves to study the primary structure. Mounting of epidermal outgrowths. Students would learn technique of sectioning and staining. Types of epidermal outgrowth and its role in a plants life cycle. Separation techniques by paper chromatography. Simple test for identification of tannin. Botanical names of plants in everyday life to cure common ailments and scientific explanation for their curative properties. 			
PRACTICAL PAPER II- FORM AND FUNCTION 1			
1	Primary structure of dicot and monocot root.		
2	Primary structure of dicot and monocot stem.		
3	Study of dicot and monocot stomata.		
4	Epidermal outgrowths: with the help of mountings Unicellular: <i>Gossypium</i> /Radish Multicellular: <i>Lantana</i> /Sunflower Glandular: <i>Drosera</i> and Stinging: <i>Urtica</i> – only identification with the help of permanent slides. Peltate: <i>Thespesia</i> Stellate: <i>Erythrina</i> / <i>Sida acuta</i> / <i>Solanum</i> / <i>Helecteris</i> T-shaped: <i>Avicennia</i>		
5	Separation of chlorophyll pigments by strip paper chromatography.		
6	Separation of amino acids by paper chromatography.		
7	Change in colour because of change in pH: Anthocyanin: black grapes/Purple cabbage		
8	Test for tannins: tea powder/catechu.		
9	Identification of plants or plant parts for grandma’s pouch as per theory.		

Scheme of Evaluation:
Evaluation Scheme for First Year (UG) under AUTONOMY

I. Internal Evaluation for Theory Courses – 40 Marks

(i) Continuous Internal Assessment 1 (Assignment-Tutorial) – 20 Marks

(ii) Continuous Internal Assessment 2 – 20 Marks (Class Test with Fill in the Blanks, True or False & Answer the following)

II. External Evaluation for Theory Courses – 60 Marks

Duration: 2 Hours

Theory question paper pattern:

All questions are compulsory.

Qn.	Based on	Type		Options	Marks
Q.1	Unit I, II & III	Objective	MCQs	<i>Attempt all 6</i>	6
			Answer in one sentence	<i>Attempt all 6</i>	6
Q.2	Unit I	Descriptive		<i>Any 2 out of 3</i>	12
Q.3	Unit II	Descriptive		<i>Any 2 out of 3</i>	12
Q.4	Unit III	Descriptive		<i>Any 2 out of 3</i>	12
Q.5	Unit I, II & III	Descriptive		<i>Any 3 out of 6</i>	12

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination

- Each core subject carries 50 Marks (30 marks External + 20 marks Internal)

Sr. No.	Undergraduate Practical Internal Evaluation:	Marks
1	Short Experiment/Field Trip/Excursion/Industrial Visit Report	15
2	Journal	5

Sr. No.	Undergraduate Practical External Evaluation:	Marks
1	Experiment/s	25
2	Viva	5

- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam.

Note:

- Two short field excursions for habitat studies are compulsory.
Field work of not less than eight hours duration is equivalent to one period per week for a batch of 15 students.
- A candidate will be allowed to appear for the practical examinations only if he/she submits a certified journal of F.Y.B.Sc. Botany or a certificate from the Head of the department / Institute to the effect that the candidate has completed the practical course of F.Y.B.Sc. Botany as per the minimum requirements. In case of loss of journal a candidate must produce a certificate from the Head of the department /Institute that the practicals for the academic year were completed by the student. However such a candidate will be allowed to appear for the practical examination but the marks allotted for the journal will not be granted.