

The Kelkar Education Trust's
V. G. Vaze College of Arts, Science and Commerce
(Autonomous)



The Kelkar Education Trust's
V. G. Vaze College of Arts, Science and Commerce (Autonomous) - Affiliated to
University of Mumbai

(Re Accredited by NAAC with Grade A)

Revised Syllabus for FYBSc
Based on NEP-2020 Guidelines

Program: B.Sc.

Undergraduate Science Program Outcomes:

PO1	Academic expertise: Exhibit knowledge of the discipline, Identify and explain seminal pieces of work in the area, Conduct guided academic inquiries in various areas of interest in the chosen discipline.
PO2	Foundational Understanding: Develop a foundational understanding of core scientific principles and theories across various disciplines of science.
PO3	Analytical Skills: Develop analytical and problem-solving skills to critically analyse scientific problems and apply scientific methodologies.
PO4	Global Perspective: Gain a global perspective by understanding diverse scientific issues and incorporating ethical considerations in scientific practices.
PO5	Research Awareness: Gain awareness of research methodologies and techniques, preparing for future research endeavours.
PO6	Holistic Development: Experience holistic development by embracing values of humanism, empathy, and social responsibility in scientific pursuits.
PO7	Continuous Learning: Develop a commitment to lifelong learning and staying updated with advancements in science.
PO8	Ethical Practices: Understand and adhere to ethical standards in scientific research and practice.

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Programme Specific Outcomes (PSOs) for B.Sc. in Botany

Sr No.	A student completing B.Sc. in Botany will be able to:
PSO1	Understand basic concepts and relationships of Classical Botany, and Advanced areas of Botany Such as Physiology and Molecular Biology, Cytogenetic and Ecology and Biodiversity etc.
PSO2	Understand the applications of Biological Sciences: Medicinal Botany, Plant Biotechnology, Bioinformatics, Horticulture, Forestry Biostatistics, Biochemistry, Environmental Sciences, Herbal Cosmetology, Pharmacognosy etc.
PSO3	Perform procedures as per laboratory standards in areas of Plant Sciences
PSO4	Appraise the importance of sustainable technology and apply scientific knowledge for conservation of nature and natural resources
PSO5	Enhance the skillset required for preparing reports, presentation, model making and entrepreneurship

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Course: BOTANY
Semester I

To Be Implemented From
Academic Year 2024-25
F.Y.B.Sc. (Botany)
Semester: I
Major/Minor Course-I
Course Title: PLANT DIVERSITY I

Course Name: PLANT DIVERSITY I

Course code: VGVUSMBO101

Credits: 04

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)40 marks					End Semester Examination	Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Written	
2	-	2	4	20	15	05		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

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Course Objectives:

- To understand the life cycle of representative Algae, Fungi and Bryophytes species.
- To understand the phenomenon of inheritance of genetic traits.
- To recognize the importance of Ecosystem, biotic and abiotic factors of various ecosystems, interactions taking place in the ecosystem

Course Outcomes :

After the successful completion of the course, Learners will able to:

CO1- Develop critical understanding of the salient features, their life cycle pattern.

CO2- know more about the fascinating world of plants which will enhance their interest for the subject.

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Unit I	ALGAE, FUNGI, BRYOPHYTES	10 Lectures
1.1	Algae: Systematic Position, Life history and economic importance of <i>Spirogyra</i> and <i>Nostoc</i>	
1.2	Fungi: Systematic Position, Life history and economic importance of <i>Rhizopus</i>	
1.3	Bryophyte: Systematic Position, Life history and economic importance of <i>Riccia</i>	
Unit II	MENDELIAN GENETICS	10 Lectures
2.1	Phenotype/Genotype, Mendelian Genetics- monohybrid, dihybrid; test cross; back cross ratios.	
2.2	Epistatic and Non-epistatic interactions; multiple alleles	
Unit III	ECOLOGY	10 Lectures
3.1	Types of ecosystems: i. Aquatic including biotic and abiotic factors (Freshwater-Lentic, Lotic, Marine ecosystem – Ocean, Estuarine) ii. Terrestrial including biotic and abiotic factors (Forest, Grassland, Desert, Cropland)	
3.2	Types of Ecological pyramids : Pyramid of Biomass, Pyramid of number, Pyramid of Energy) and their significance	

References:

1. Sharma, O.P. (1986) Textbook of Algae.
2. Pandey, B. P. (1994) Textbook of Botany – Algae.
3. Vashista, B. R. (1995) Botany for degree students-Algae.
4. Sharma, O.P. (1989): Textbook of Fungi.
5. Vashista, B. R. (1995) Botany for degree students-Fungi.
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8. Chopra, R. N. and P. K. Kumar (1988): Biology of Bryophytes.
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11. Sharma, A. K. and Sharma, A. 1980. Chromosome techniques- Theory and practice. Butterworth and Co. (Publishers) Ltd., London.
12. Karp Gerald. 2015 Cell and Molecular Biology. Global Publications.
13. Russell P. J. 1998. Genetics (Fifth edition) Benjamin / Cummings Publishing

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Company Canada

14. Ecology workbook – R. Misra
15. Plant Ecology – Weaver and Clemests
16. Principles of Environmental Biology – P.K. Nair, 1979
17. Fundamentals of Ecology – E.P. Odum, 1996
18. Ecology – E. P. Odum.
19. Ecology and Environment – P. D. Sharma, Rastogi publications, Meerut
20. Concept of Ecology (Environmental Biology) - P. S. Verma, V. K. Agarwal, S. Chand and Company Ltd. New Delhi.
21. Golatkar V.V., Patel B.B., Tutakne N.S. A New Course in Botany, FYBSc, Semester I & II, Sheth Publications, Mumbai.
22. Botany-II Form and Function I, F.Y.B.Sc., Semester I. Tech-Max Publications, Pune.

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PRACTICALS BASED ON PLANT DIVERSITY I

Course code: VGVUSPBO101

Credits:02

Course Objectives:

The Practical intends to:

- Understand the, general and reproductive characters of *Spirogyra*, *Nostoc*, *Rhizopus* and *Riccia*

Course outcome:

After successful completion of practicals, the learner will be able

1. To identify *Spirogyra*, *Nostoc*, *Rhizopus* and *Riccia* with respect to morphological and anatomical features

Sr. No.	Description
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.	Study of stages in the life cycle of <i>Rhizopus</i> from fresh/ preserved material and permanent slides.
4.	Study of stages in the life cycle of <i>Riccia</i> from fresh/ preserved material with the help of permanent slides.
5.	Examining various stages of mitosis in root tip cells (<i>Allium</i>)
6.	Study of Mendelian Monohybrid and Dihybrid ratio
7.	Calculation of mean, median and mode.
8.	Calculation of standard deviation.
9.	Frequency distribution, graphical representation of data- frequency polygon, Histogram, pie chart.
10.	Study of Karyotypes: Human: Normal male and female, <i>Allium cepa</i> .

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**Revised Syllabus for FYBSc
Based on NEP-2020 Guidelines**

**Program: B.Sc.
Course: BOTANY
Semester II**

**To Be Implemented From
Academic Year 2024-25
F.Y.B.Sc (Botany)
Semester: II**

**Major/ Minor Course-II
Course Title: PLANT DIVERSITY II**

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Course Name: PLANT DIVERSITY II
Credits:04

Course Code: VGVUSMBO201

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Written	
2	-	2	4	20	15	05		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives	
1.	To understand the classification, general characters of the classes of Pteridophyta.
2.	To understand morphology, anatomy, structure and life cycle of respective groups of plants.
3.	To understand morphology of Flower, Inflorescence and variation.
4.	To learn families on the basis of vegetative and floral characters and understand variation in these families.

Course Outcomes: After the successful completion of the course, Learners will able to	
CO1	To develop critical understanding on the salient features, life cycle pattern and identify plant systems.
CO2	To know economic importance of various species of respective group of Plants
CO3	To know more about the fascinating world of plants which will enhance their interest for the subject.
CO4	To develop critical understanding on family's identification according to Bentham and Hookers system of classification and economic importance of plants

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PLANT DIVERSITY II

Unit I	PTERIDOPHYTES, GYMNOSPERMS, ANGIOSPERMS AND ANATOMY	10 Lectures
1.1	Pteridophytes: Systematic Position, Life history and economic importance of <i>Adiantum</i> .	
1.2	Gymnosperms: Systematic Position, Life history and economic importance of <i>Cycas</i>	
1.3	Angiosperms: Morphology of flower – All Parts of Flower, Types of Inflorescence-Racemose, Cymose & their types,	
1.4	Anatomy: Simple and Complex Tissues	
Unit II	CELL BIOLOGY	10 Lectures
2.1	Cell :Structure of Prokaryotic and Eukaryotic Cell General structure of plant cell: Ultra structure of Cell wall and its functions	
2.2	Ultra structure of Plasma membrane (lipid bilayer structure, fluid mosaic model) and its functions with respect to transport of ions across cell membranes, active and passive transport, importance of carriers, channels and pumps	
2.3	Ultrastructure of chloroplast and its functions	
Unit III	PHYSIOLOGY	10 Lectures
3.1	Photosynthesis: Light reactions, Photolysis of water, Photophosphorylation (cyclic and non-cyclic),	
3.2	Carbon fixation phase (C ₃ , C ₄ and CAM pathways)	

Reference

1. Rashid, A. (1978) - An introduction to pteridophytes
2. Vashishta, B.R. (1996) - Botany for degree students – Pteridophytes
3. Chamberlein, C.J. (1966) - Gymnosperms, Structure and Evolution
4. Ramanujan, C.G.K. (1979) - Indian Gymnosperms in Time and Space
5. Vashishta, P.C. (1976) - The Gymnosperms
6. A Textbook of Botany: Angiosperms - Taxonomy, Anatomy, Embryology and Economic Botany -Publisher: S Chand & Co Ltd
7. Sharma, O. P. 1993. Plant Taxonomy. Tata McGraw Hill Publishing Co. Ltd.; New Delhi
8. Sambamurty, A. V. S. S. 2005. Taxonomy of Angiosperms. I. K. International Pvt.Ltd., New Delhi.
9. A Cutter, E G 1971 Plant Anatomy
10. Emmes, E J. and M C Daniels, 1947: An introduction to plant anatomy.
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12. Fahn, A.1969: Secondary Tissue system

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14. Masueth, J D. 1936 : Plant anatomy
15. Metcalfe, C R and L Chalk, 1950: Anatomy of the dicotyledons
16. Noggle, G.R. and Fritz, G. J. (1976): Introductory Plant Physiology
17. Salisbury, F. B. and Ross, C.W.(1992): Plant Physiology IV ed.
18. Taiz, L. and Ziegler, F. (1998): The Plant Physiolog
19. Govindjee, H. (1982): Photosynthesis Vol. I & II.
20. Hopkins, W. C. (1995): Introduction to Plant Physiology

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Semester II Practical

Course code: VGVUSPBO201

(CREDITS-02)

Course (Practical) Objectives –The Practical intends to

1. To understand the, general and reproductive characters of *Adiantum* and *Cycas*
2. Understand and observe Morphology of Flowers and Inflorescence using Plant Specimen
3. To learn the difference between families of Angiosperms on the basis of morphological characters.

Course (Practical) outcomes: After successful completion of practicals, the learner will be able to

CO1: Identification of *Adiantum*, *Cycas* on the basis of morphological and anatomical structure.

CO2: Will be able to understand morphology of Flower and inflorescence to classify the families.

CO3: Will be able to learn classification of families according to Bentham and Hooker's system of classification.

Practicals based on Plant Diversity I

1. Study of stages in the life cycle of *Adiantum* from fresh/ preserved material and permanent slides.
2. Study of stages in the life cycle of *Cycas* from fresh/ preserved material and permanent slides
3. Study of Morphology of Flowers using fresh/ preserved material
4. Study of Inflorescence from fresh/ preserved material
5. Study of Angiosperm families: Malvaceae, Amaryllidaceae.

Sr. No.	Description
1.	<ol style="list-style-type: none">i. Study of stages in the life cycle of <i>Adiantum</i>:ii. T.S. of rachis.iii. T.S. of the pinna of <i>Adiantum</i> passing through sorus.
3.	<p>Study of stages in the life cycle of <i>Cycas</i>:</p> <ol style="list-style-type: none">i. T.S of leaflet (<i>Cycas</i> pinna),ii. Megasporophyll, Microsporophyll, coralloid root, microspore, L.S. of ovule of <i>Cycas</i> – all specimens to be shown.

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4.	Identification of cell organelles
5.	Study of mitosis in onion root tips
6.	Gram's staining Technique
7.	Study of Angiosperm families :Malvaceae and Amaryllidaceae
8.	Primary structure of dicot and monocot root.
9.	Primary structure of dicot and monocot stem
10.	Study of dicot and monocot stomata
11.	Epidermal outgrowths: with the help of mountings i. Unicellular: <i>Gossypium</i> (Cotton) /Radish ii. Multicellular: <i>Lantana</i> /Sunflower iii. Glandular: <i>Drosera</i> and Stinging: <i>Urtica</i> – only identification with the help of permanent slides. iv. Peltate: <i>Thespesia</i> v. Stellate: <i>Erythrina</i> / <i>Sida</i> / <i>Solanum</i> / <i>Helecteris</i> vi. T-shaped: <i>Avicennia</i>
12.	Study of types of Vascular bundles
13.	Study of effect of osmosis on plant cells
14.	Study of Hill's Reaction (Demonstration)

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Program: F. Y. B. Sc	Semester I/II
Course: Botany	Course Code:
(Internal Assessment)	Marks: 40
1. Class Test: (Based on Theory Unit 1, 2 and 3)	15 marks
2. Internal Assignment:	15 marks
3. Attendance/Class Participation and Overall conduct	10 Marks

Semester I/II (Plant Diversity I)	(Internal Class Test Paper Pattern)
Duration: 30 mins	Marks: 15
Q. 1. Fill in the blanks:	05 marks
Q. 2. Answer the following (Any two out of three question)	10 marks
Semester I/II (Plant Diversity) Paper I	(Theory Paper Pattern)
Duration: 02 hrs	Marks: 60
Q1A. Answer the following (Unit 1) 1. Or 2.	7 Marks 7 Marks
Q1B. Answer any two of the following 1. 2. 3.	8 Marks
Q2A. Answer the following (Unit 2) 1. Or 2.	7 Marks 7 Marks
Q2B. Answer any two of the following 1. 2. 3.	8 Marks
Q3A. Answer the following (Unit 3) 1. Or 2.	7 Marks 7 Marks
Q3B. Answer any two of the following 1. 2. 3.	8 Marks
Q4. Answer the following (All questions compulsory) 1. 2. 3	15 Marks

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