Progressive Education Society's

Modern College of Arts, Science and Commerce,

Shivajinagar, Pune 5

(An Autonomous College Affiliated to Savitribai Phule Pune University)

Detailed Syllabus

For B.Sc. Botany

(2019-20 Course)

(with effect from 2019-20)

CIA: Continuous Internal Evaluation

Semester 1 (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem	Total
CCT-1	**19ScBotU101**	**Plant Diversity I**	3	2	40	60	100
CCT-2	**19ScBotU102**	**Plant Morphology**	3	2	40	60	100
CCP-1	**19ScBotU103**	**Practical course**	4	2	40	60	100
	Total			**6**			

Semester II (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem	Total
CCT-1	**19ScBotU201**	**Plant Diversity II**	3	2	40	60	100
CCT-2	**19ScBotU202**	**Plant Anatomy and Embryology**	3	2	40	60	100
CCP-1	**19ScBotU203**	**Practical Course**	4	2	40	60	100
	Total			**6**			

Progressive Education Society's

Modern College of Arts, Science and Commerce, (Autonomous)

Shivajinagar, Pune – 5

First Year of B.Sc. (2019 Course)

Course Code: 19ScBotU101

Course Name: Plant Diversity – I

Teaching Scheme: TH - 3hrs/week **No. of credits: 2**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Pre-requisite: A student should have thorough background of biology learnt at 10+2 level.

Course Objectives:

- To deliver systematic knowledge about diversity in plants.
- To create awareness in the students about the importance of plants in human life.
- To prepare the students with abilities related to laboratory as well as field based studies.
- To make the students aware of conservation and sustainable use of plants.
- To create base for advanced studies in Botany.

Course Outcomes:

On completion of this course, students will be able to:

- Recognize the major groups of non-vascular plants
- Understand the diversity among the non-vascular plants
- At ease with the general features, classification, and life cycle patterns in non-vascular plants
- Understand useful and harmful activities of non-vascular plants

Course Contents:

Chapter 1	Introduction to Plant Diversity	3 Lectures
	1.1. Definition 1.2. Concept 1.3. General outline of plant kingdom 1.4. Importance of plant diversity	
Chapter 2	Algae	10 Lectures
	2.1. General characters - habitat, thallus diversity, cell structure, pigmentation and food reserve, reproduction and life cycle pattern 2.2. Outline classification according to G.M. Smith (1955) up to classes with reasons 2.3. Occurrence, thallus structure, mode of reproduction and Life cycle pattern in *Nostoc*	

	and *Spirogyra* 2.4. Economic importance of algae	
Chapter 3	Fungi	10 Lectures
	3.1. General characters - Occurrence, cell structure, structure of mycelium, mode of nutrition and reproduction 3.2. Outline classification according to G.M.Smith (1955)up to classes with reasons 3.3. Occurrence, thallus structure, mode of reproduction and life cycle pattern in *Rhizopus* and *Agaricus* 3.4. Economic importance of fungi	
Chapter 4	Lichens	3 Lectures
	4.1. General characters 4.2. Types of Lichens on the basis of thallus morphology and internal structure 4.3. Mode of reproduction 4.4. Economic importance of lichens	
Chapter 5	Bryophytes	9 Lectures
	5.1. General characters 5.2. Outline classification according to G.M. Smith (1955) up to classes with reasons 5.3. Occurrence, morphology of thallus, internal structure of thallus, mode of reproduction and life cycle pattern in *Riccia* and *Anthoceros* 5.4. Economic importance of bryophytes	
Chapter 6	Guidance/discussion on course specific experiential learning field work	1 Lecture

References:

1. Alexopoulos CJ, Mims CW and Blackwell M (2007) Introductory Mycology, 4th edition. Wiley Publication.
2. Awasthi DD (2013) A handbook of Lichens, Publisher: M/s Bishen Singh Mahendra Pal Singh.

3. Chopra R.N. and Kumar P.K. (1988). Biology of Bryophytes. John Wiley &Sons, New York.
4. Dube HC (2012) An Introduction to Fungi, 4th Edition. Scientific Publishers.
5. Gangulee HS, Das KS and Datta C (2011) College Botany Vol. I, New Central Book Agency(P) Ltd.
6. Kumar HD (1999) Introductory Phycology, East Western Press, New Delhi.
7. Mehrotra R.S. and Aneja K.R. (1990). An introduction to mycology. New AgePublishers.
8. Parihar NS (1962) Bryophyta, Central Book Depot, Allahabad.
9. Sharma OP (1988) Textbook of Fungi, McGraw-Hill Higher Education.
10. Sharma OP (1992) Textbook of Thallophytes, McGraw Hill Pub. Co.
11. Sharma PD (2017) Fungi and Plant pathology, Rastogi Publication.
12. Sinha V, Pande PC and Jain DK (2018) A text book of Botany: Biodiversity, Rastogi Publication, Meerut.
13. Smith GM (1971) Cryptogamic Botany. Vol. I Algae and Fungi, Tata McGraw HillPublishing Co. New Delhi.
14. Smith GM (1971) Cryptogamic Botany. Vol. II Bryophytes and Pteridophytes, Tata McGraw Hill Publishing Co. NewDelhi.
15. Vashishtha BR (2012) Botany for Degree Students Part I Algae, S. Chand and Company,New Delhi.
16. Vashishtha BR and Sinha AK (2012) Botany for Degree Students Fungi, S. Chand and Company, New Delhi.
17. Vashishtha BR, Sinha AK and Kumar A (2012) Botany for Degree Students – Bryophyta, S. Chand and Company, New Delhi.

Progressive Education Society's

Modern College of Arts, Science and Commerce, (Autonomous)

Shivajinagar, Pune – 5

First Year of B.Sc. (2019 Course)

Course Code: 19ScBotU102

Course Name: Plant Morphology

Teaching Scheme: TH - 3hrs/week **No. of credits: 2**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Prerequisite:

A student should have a thorough background of Biology learnt at 10 + 2 level.

Course Objectives:

- To study morphology of angiospermic plants
- To learn technical terms to describe morphological features

Course Outcomes:

On completion of the course, student will be able to:

- Understand plant morphology
- Understand basics of floral morphology
- Understand how plant morphology relates to plant reproduction
- Understand significance of morphological modifications of plant parts
- Have foundation for a course on Plant Systematics

Course Contents

Chapter 1	Introduction to Plant Morphology	1 lecture
	1.1 Importance of plant morphology 1.2 Parts of an angiospermic plant	
Chapter 2	Morphology of root	4 lectures
	2.1 Characteristics of roots 2.2 Types of root system 2.3 Regions of the root 2.4 Modifications of root	
Chapter 3	Morphology of stem	5lectures
	3.1 Characteristics of stem 3.2 Forms of stem 3.3 Bud and its modifications 3.4 Habit of the plant: parasitic, mycoheterotropic and epiphytic plants 3.5 Modifications of stem 3.6 Types of branching 3.7 Functions of stem	
Chapter 4	Morphology of leaf	6 lectures
	4.1 Parts of a leaf, types of leaves, types of stipules and their modifications, leaf blade w.r.t. apex, margin, and	

	shape 4.2 Venation 4.3 Simple and compound leaves 4.4 Modifications of leaves 4.5 Phyllotaxy 4.6 Functions of leaves	
Chapter 5	The inflorescence	4 lectures
	5.1 Definition 5.2 Classification of inflorescences 5.3 Racemose and its types 5.4 Cymose and its types	
Chapter 6	The flower	8 lectures
	6.1 Flower as a modified shoot, structure of flower, types of flower, thalamus, bracts 6.2 Symmetry of the flower 6.3 Calyx and its modifications 6.4 Forms of corolla 6.5 Androecium:Parts of stamen, cohesion of stamens, adhesion of stamens, length of stamens 6.6 Gynoecium: Parts of carpel, simple and compound gynoecium, cohesion of carpels, placentation and its types	
Chapter 7	The fruit	4 lectures
	7.1 Definition 7.2 Parts of fruit 7.3 Classification of fruits 7.4 Dispersal of seeds and fruits	
Chapter 8	The seed	3 lectures
	8.1 Definition 8.2 Parts of dicotyledonous and monocotyledonous seeds 8.3 Seed germination and its types	
Chapter 9	Guidance/ Discussion on course specific experiential learning field work	1 Lecture

References:

1. Botany for Degree Students, A.C.Dutta, Oxford University Press
2. Morphology and Economic Botany of Angiosperms, S SundararRajan, Anmol Publications Pvt Ltd
3. Morphology of Vascular Plants, E.J.Eames, Standard University Press.
4. Taxonomy of Angiosperms, V. N. Naik, Tata Mc GrawHill Publishing Comp.
5. Taxonomy of Angiosperms, V. Singh and D. K. Jain, Rastogi Publications
6. A Text Book of Botany- Angiosperms, B. P. Pandey, S. Chand and Comp. Ltd.
7. A Text Book of Practical Botany II, Ashok Bendreand Ashok Kumar, Rastogi Publication
8. Taxonomy of Vascular Plants, GHM Lawrence, Scientific Publishers

Progressive Education Society's

Modern College of Arts, Science and Commerce, (Autonomous)

Shivajinagar, Pune – 5

First Year of B.Sc. (2019 Course)

Course Code: 19ScBotU103

Course Name: Botany Practical

Teaching Scheme: TH - 3hrs/week **No. of credits: 2**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Pre-requisite: A student should have thorough background of biology learnt at 10+2 level.

Course objectives:

- The study of macroscopic and microscopic characters and identification of algae, fungi, lichens and bryophytes.
- To learn the vegetative and reproductive structures of angiospermic plants and their functions and modifications.

Course outcomes:

On completion of this course, students will be able to:

- Distinguish between different plant groups
- Make a thorough background for a course on Plant Systematics

Course Content:

1. Study of *Nostoc* and *Spirogyra*
2. Study of *Rhizopus* and *Agaricus*
3. Study of *Riccia*
4. Study of *Anthoceros*
5. Study of Lichens
6. Study of root and its modifications
7. Study of stem and its modifications
8. Study of leaf and its modifications
9. Study of inflorescences
10. Study of flowers
11. Study of fruits
12. Field visit

Progressive Education Society's

Modern College of Arts, Science and Commerce, (Autonomous)

Shivajinagar, Pune – 5

First Year of B.Sc. (2019 Course)

Course Code: 19ScBotU201

Course Name: Plant Diversity - II

Teaching Scheme: TH - 3hrs/week **No. of credits: 2**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Pre-requisite: A student should have thorough background of biology learnt at 10+2 level.

Course Objectives:

- To familiarize the students about the major groups of vascular plants.
- To create awareness in the students about the importance of plants in human life.
- To prepare the students with abilities related to laboratory as well as field based studies.
- To make the students aware about conservation and sustainable use of plants.
- To create base for advance studies in Botany.

Course Outcomes:

On completion of this course, students will be able to:

- Distinguish the major groups of vascular plants
- Understand the diversity among the vascular plants
- At ease with the general features, classification, and life cycle patterns in vascular plants
- Know the economic and ecological importance of vascular plants

Course Contents

Chapter 1	Introduction	1 Lecture
	1.1 General characters of vascular plants	
Chapter 2	Pteridophytes	3 Lectures
	2.1. General characters of pteridophytes 2.2. Outline classification according to G.M. Smith (1955) upto classes with reasons 2.3. Ecological and economic importance of pteridophytes 2.4. Concept of stele and its types	
Chapter 3	Life Cycle of *Selaginella* and *Nephrolepis*	12 Lectures
	3.1. Occurrence, structure of sporophyte, internal structure of root, rhizophore, stem and leaf, mode of reproduction and life cycle pattern in *Selaginella* 3.2. Occurrence, structure of sporophyte, internal structure of stolon, rachis and pinna passing through sorus, mode of reproduction and life cycle pattern in *Nephrolepis*	

Chapter 4	Gymnosperms	4 Lectures
	4.1. General characters of gymnosperms 4.2. Outline classification according to Chamberlain (1934) upto classes with reasons 4.3. Economic importance of gymnosperms	
Chapter 5	Life cycle of *Cycas* and *Pinus*	12 Lectures
	5.1. Occurrence, structure of sporophyte, internal structure of root, stem and pinna, mode of reproduction and life cycle pattern in *Cycas* 5.2. Occurrence, structure of sporophyte, internal structure of root, stem and leaf, mode of reproduction and life cycle pattern in *Pinus*	
Chapter 6	Angiosperms	3 Lectures
	6.1. General characters of angiosperms 6.2. Causes of evolutionary success of angiosperms 6.3. Economic importance of angiosperms	
Chapter 7	Guidance/discussion on course specific experiential learning field work	1 Lecture

References:

1. Rashid A (1999) An Introduction to Pteridophyta, Vikas Publishing House Pvt. Ltd. New Delhi.
2. Sharma OP (1990) Textbook of Pteridophyta. MacMillan India Ltd. Delhi.
3. Sporne KR (1986) The morphology of Pteridophytes. Hutchinson University Library, London.
4. Vashishtha BR, Sinha AK and Kumar A (2010) Botany for Degree Students – Pteridophyta, S. Chand and Company, New Delhi.
5. Vashishtha BR, Sinha AK and Kumar A (2010) Botany for Degree Students – Gymnosperms, S. Chand and Company, New Delhi.
6. Sundar Rajan S.(1999) Introduction to Pteridophyta. New Age International Publishers, New Delhi.
7. Parihar NS (1976) Biology and Morphology of Pteridophytes. Central Book Depot.
8. Bhatnagar SP (1996) Gymnosperms, New Age International Publisher.
9. Pandey BP (2010) College Botany Vol II S. Chand and Company, New Delhi.
10. Naik VN (1994) Taxonomy of Angiosperms, Tata Mc Graw Hill PublishingComp., New Delhi.
11. Singh V and Jain DK (2010) Taxonomy of Angiosperms, Rastogi Publications, Meerut.
12. Verma BK (2010) Introduction to Taxonomy of Angiosperms, Prentice-Hall of India Pvt. Ltd.

Progressive Education Society's

Modern College of Arts, Science and Commerce, (Autonomous)

Shivajinagar, Pune – 5

First Year of B.Sc. (2019 Course)

Course Code: 19ScBotU202

Course Name: Plant Anatomy and Embryology

Teaching Scheme: TH - 3hrs/week **No. of credits: 2**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Prerequisite:

- A student should have a thorough background of Biology learnt at 10 + 2 level and knowledge of fundamentals of Plant Morphology.

Course Objectives:

- To study internal organisation of various plant organs
- To study basics of embryology and reproduction in angiosperms

Course Outcomes:

On completion of the course, student will be able to:

- Identify various plant tissues and tissue systems
- Understand the relation between form, structure and function of plant organs
- Differentiate between stem and root on the basis of internal organisation
- Correlate between flower morphology and methods of reproduction in angiosperms

Course Contents

Chapter 1	The cell	5 lectures
	1.1 Structure of plant cell 1.2 Functions of plant cell 1.3 The cell wall 1.4 Growth of the cell wall 1.5 Thickening of the cell wall 1.6 Chemical nature of cell wall 1.7 Chemical changes in the cell wall	
Chapter 2	Plant tissues	4 lectures
	2.1 Meristematic tissue and its types 2.2 Structure of shoot and root apical meristem 2.3 Simple and complex tissues 2.4 Secretory tissues	
Chapter 3	Epidermal tissue system	4lectures
	3.1 Structure and functions of epidermis 3.2 Structure of stomata, types of stomata 3.3 Epidermal outgrowths and their types	
Chapter 4	Mechanical tissue system	3 lectures
	4.1 Types of mechanical tissues	

	4.2 Principles of their distribution	
Chapter 5	Anatomy of stem	2lectures
	5.1 Internal structure of young and mature dicot stem 5.2 Internal structure of monocot stem	
Chapter 6	Anatomy of root	2 lectures
	6.1 Internal structure of young dicot and monocot root	
Chapter 7	Anatomy of leaf	2 lectures
	7.1 Internal structure of dorsiventral leaf and isobilateral leaves	
Chapter 8	Secondary growth	4 lectures
	8.1 Nature and need of secondary growth 8.2 Normal secondary growth in dicot stem 8.3 Anomalous secondary growth in dicot and monocot stem	
Chapter 9	Embryology of angiosperms	9 lectures
	9.1 Structure of microsporangium, microsporogenesis, structure of pollen grain 9.2 Structure of megasporangium and its types, megasporogenesis 9.3 Structure and types of female gametophyte 9.4 Pollination, types of pollination, their advantages and limitations 9.5 Methods of pollination, contrivances of pollination 9.6 Germination of pollen grain, structure of male gametophyte 9.7 Fertilization, structure of dicot and monocot embryo	
Chapter 10	Guidance/ Discussion on course specific experiential learning field work	1 Lecture

References:

1. Botany for Degree Students, A.C.Dutta, Oxford University Press
2. Anatomy of Angiosperms, V. Singh, A.C. Pande and D.K.Jain, Rastogi Publication
3. Anatomy and Embryology of Angiosperms, Singh, Pande and Jain, Rastogi Publication
4. Plant Anatomy, M.S.Tayal, Rastogi Publication
5. Plant Anatomy, B. P. Pandey, S. Chand and Comp. Ltd. .
6. Anatomy of Seed Plants, K. Esau, John Wiley and Sons publication.
7. Plant Anatomy, Pijush Roy, New Central Book Agency (P) Ltd.
8. Plant Anatomy, P.J. Chandurkar, Oxford and IBH Publishing Co. Pvt. Ltd.
9. An Embryology of Angiosperms, S.S.Bhojwani and S.P Bhatnagar, Vikas Publishing House
10. An Introduction to Embryology of Angiosperms, P. Maheshwari, McGraw Hill Publication.

Progressive Education Society's

Modern College of Arts, Science and Commerce, (Autonomous)

Shivajinagar, Pune – 5

First Year of B.Sc. (2019 Course)

Course Code: 19ScBotU203

Course Name: Botany Practical

Teaching Scheme: TH - 3hrs/week **No. of credits: 2**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Pre-requisite: A student should have thorough background of biology learnt at 10+2 level.

Course objectives:

- The study of macroscopic and microscopic characters and identification of pteridophytes and gymnosperms.
- To study the internal structure of various parts of angiospermic plant.

Course outcomes:

On completion of this course, students will be able to:

- Distinguish between different plant groups
- Differentiate various parts of angiospermic plant on the basis of internal organization

Course Content:

1. Study of *Selaginella*
2. Study of *Nephrolepis*
3. Study of *Cycas*
4. Study of *Pinus*
5. Economic importance of angiosperms with reference to food, fibre, medicine, timber, dyes and gums.
6. Study of simple and complex plant tissues with respect to structure and distribution.
7. Study of epidermal tissue system
8. Study of mechanical tissue system
9. Comparative study of dicot and monocot stem and root.
10. Study of normal and abnormal secondary growth in stem.
11. Study of internal structure of stamen, and pollen viability.
12. Study of types of ovule and embryo.