### ACADEMIC (1-BOARD OF STUDIES) SECTION

**Phone:** (02462) 229542  
**Fax:** (02462) 229574  
**Website:** www.srtmun.ac.in  
**E-mail:** bos.srtmun@gmail.com

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<table>
<thead>
<tr>
<th>1.</th>
<th>Agricultural Microbiology</th>
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<td>2.</td>
<td>Agrochemicals &amp; Fertilizers</td>
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<td>3.</td>
<td>Analytical Chemistry</td>
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<td>4.</td>
<td>B.C.A.</td>
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<td>5.</td>
<td>B.Voc. (Food Processing, Preservation and Storage)</td>
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<td>6.</td>
<td>B.Voc. (Web Printing Technology)</td>
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<td>7.</td>
<td>Biochemistry</td>
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<td>Computer Application (Optional)</td>
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<td>16.</td>
<td>Computer Science</td>
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<td>17.</td>
<td>Dairy Science</td>
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<td>Dyes and Drugs</td>
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<td>19.</td>
<td>Electronics</td>
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<td>Environmental Science</td>
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<td>Fishery Science</td>
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<td>Food Science</td>
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<td>Statistics</td>
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<td>33.</td>
<td>Zoology</td>
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The pattern of examinations for all courses has been finalized and published on the website www.srtmun.ac.in. The pattern adheres to the C.B.C.S. (Choice Based Credit System) Pattern. The courses offered include:

1. Agricultural Microbiology
2. Agrochemicals & Fertilizers
3. Analytical Chemistry
4. B.C.A.
5. B.Voc. (Food Processing, Preservation and Storage)
6. B.Voc. (Web Printing Technology)
7. Biochemistry
8. Bioinformatics
9. Biophysics
10. Biotechnology (Vocational)
11. Biotechnology
12. Botany
13. Chemistry
14. Computer Application (Optional)
15. Computer Science (Optional)
16. Computer Science
17. Dairy Science
18. Dyes and Drugs
19. Electronics
20. Environmental Science
21. Fishery Science
22. Food Science
23. Geology
24. Horticulture
25. Industrial Chemistry
26. Information Technology (Optional)
27. Mathematics
28. Microbiology
29. Network Technology
30. Physics
31. Software Engineering
32. Statistics
33. Zoology

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**Date and Time of Examinations:**

- **2019-20**
- **BSD Pattern:
- **Vocational Courses:**
- **optional courses:**

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**Notice:**

- **Departmental Notice:**
- **Exam Date:**
- **Exam Time:**
- **Exam Venue:**

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**Contact:**

- **Office:**
- **Website:**
- **Email:**

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**General Instructions:**

1. Download the latest syllabus from the website.
2. Attend all classes regularly.
3. Read the exam pattern and syllabus carefully.
4. Prepare for the exams thoroughly.
5. Good luck!
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS)

for
Faculty of Science and Technology
Under Graduate Program

SUBJECT: BOTANY

B. Sc. First Year

With Effect from June 2019.
**Introduction:**

The University Grants Commission (UGC) has initiated several measures to bring equity, efficiency and excellence in the Higher Education System of country. The important measures taken to enhance academic standards and quality in higher education include innovation and improvements in the curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters.

Swami Ramanand Teerth Marathwada University has several initiatives towards academic excellence, quality improvement and administrative reforms. In view of this priority and in-keeping with Vision and Mission, process was already initiated towards introduction of semester system, grading system and credit system. University had implemented Choice Based Credit System (CBCS) pattern at UG level from the academic year 2016-2017 progressively.

Revision and updating of the curriculum is the continuous process to provide an updated education to the students at large. In view of this priority and in-keeping with Vision and Mission, process of revision and updating the curriculum is initiated and implemented at UG level from the academic year 2019-2020 progressively. Presently there is wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. To ensure uniform curriculum at UG level, curriculum of different Indian Universities, syllabus of NET, SET, MPSC, UPSC, Forest Services and the UGC model curriculum are referred to serve as a base in updating the same.

The CBCS provides choice for students to select from the prescribed courses. The choice based credit system provides a ‘cafeteria’ type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our university has already introduced the choice based credit system. The semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning.

Keeping in mind BoS in Botany prepared the curriculum to ensure up-to-date level of understanding of plant sciences. Studying plant sciences prepares the students for a career working either in an educational institution or an industry in which they can be directly involved in the research and development and Knowledge of modern and applied plant science and excellent career prospects.

The study of Botany aims to expand and increase current knowledge about plants in order to
solve problems in many fields including agriculture, ecology, medicine, biotechnology and horticulture are some of the objectives kept in mind during executing the syllabus. How plants function at the cellular, tissue, organ, and organismal levels? How evolution of plants and how they contribute to biodiversity. How interactions with each other impacts their physical environment are the core objectives. 

The addition of Skill enhancement courses aims to develop skills in plant sciences and practical experience in the students. 

At the end of the curriculum, the student should have increased: an aptitude towards science and nature and also undertakes the fundamental and applied research in plant science in the benefit of the human and nature. 

At last comments, suggestions are welcome from all the teachers, stakeholders and students for the upbringing the curriculum. 

**Salient Features :**

The syllabus of B Sc Botany has been framed to meet the requirement of Choice Based Credit System. The courses offered here in will train and orient the students in the specific fields of Botany. 

The Section A of DSEB deals with Cell Biology, Genetics & Molecular Biology, Plant Breeding & Biotechnology. The Section B of DSEB with choice provides an option to learn courses like Plant Pathology, Analytical Techniques in Plant Sciences, Herbal Drug Technology, Plant Systematics, Research Methodology and Bioinformatics. 

This would help students to lay a strong foundation in the field of Botany. 

Overall after completion of this course, students will also acquire fundamental knowledge in Plant Science and also understand that Botany is an integral part of the human life and developments. 

Skill Enhancement Courses offered during third year of this program are being designed with the aim of imparting specific skills to the students which will lead to the self employability through development of their own enterprises.
Utility of Program

This program will train and orient the students in the field of diversity of different life forms of plants and microbes, Plant Ecology, Taxonomy of Angiosperms, Plant Anatomy, Plant Embryology, Plant Physiology, Plant Metabolism and Biochemistry, Cell Biology, Genetics & Molecular Biology, Plant Pathology, Analytical Techniques in Plant Sciences, Herbal Drug Technology, Plant Breeding & Biotechnology, Plant Systematics, Research Methodology and Bioinformatics in relation to Environment and Agriculture as well as Biotechnological, Pharmaceutical and Herbal Industries. This will help the students for their career development. Skill Enhancement Courses being offered during this program will provide job opportunities and additional specific skills to the students for self employability through the development of their own enterprises.

Learning Objectives:

The Objective of this program are:

1. To provide an updated education to the students at large in order to know the importance and scope of the discipline and to provide mobility to students from one university or state to other.

2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.

3. To impart knowledge of plant science as the basic objective of Education.

4. To develop a scientific attitude to make students open minded, critical and curious.

5. To develop an ability to work on their own and to make them fit for the society.

6. To expose themselves to the diversity amongst life forms.

7. To develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of plant materials and data.

8. To make aware of natural resources and environment and the importance of conserving the same.

9. To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self reliant and self sufficient.
10. To appreciate and apply ethical principles to plant science research and studies.

Prerequisite:

The optional courses are offered to the students registered for undergraduate programs. Such students should have the basic knowledge of Plant Science and willing to gain additional knowledge in the field of Botany. Admissions to B Sc course are given as per the University rules.
SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

SEMESTER PATTERN CURRICULUM UNDER

CHOICE BASED CREDIT SYSTEM (CBCS) FOR
Under Graduate Course
Faculty of Science and Technology

SUBJECT: BOTANY

CLASS: B. Sc. FIRST YEAR
An Outline:

<table>
<thead>
<tr>
<th>Semester/ Annual</th>
<th>Course Name</th>
<th>Paper No. &amp; Title</th>
<th>Total Periods (periods/ week)</th>
<th>Marks for (ESE)</th>
<th>Marks for (CA)</th>
<th>Credits (Marks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester-I</td>
<td>CCB-I</td>
<td>Section-A</td>
<td>Theory Paper-I: Viruses, Bacteria Algae, Fungi, Lichens and Mycorrhiza</td>
<td>45 (03/week)</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section-B</td>
<td>Theory Paper-II: Plant Ecology, Phytogeography and Environmental Biology</td>
<td>45 (03/week)</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>Semester-II</td>
<td>CCB-II</td>
<td>Section-A</td>
<td>Theory Paper-III: Bryophytes, Pteridophytes Gymnosperms and paleobotany</td>
<td>45 (03/week)</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section-B</td>
<td>Theory Paper-IV: Taxonomy of Angiosperms</td>
<td>45 (03/week)</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>Annual pattern</td>
<td>CCBP-I</td>
<td>Practical Paper-V: Practicals based on theory papers of CCB-I&amp;II</td>
<td>24 Prac. (03/week/ batch)</td>
<td>80</td>
<td>20</td>
<td>Credits: 04 (Marks:100)</td>
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</tbody>
</table>

Total 240 60 Credits: 12 (Marks:300)

CCB: Core Course Botany, CCBP: Core Course Botany Practical, ESE: End Semester Examination, CA: Continues Assessment,

Distribution of Credits: 80 % of the total credits for the ESE and 20% for CA

CA of 10 Marks (Theory) : 05 Marks for test & 05 Marks for Assignment

CA of 20 Marks (Practicals): : 10 Marks for test &10 Marks for Record Book ,Submission of collection and field note and Excursion Report.
### An Outline:

<table>
<thead>
<tr>
<th>Semester/Annual</th>
<th>Course No.</th>
<th>Course Name</th>
<th>Instruction Hrs/week</th>
<th>Total Periods</th>
<th>Marks for Credits</th>
<th>Credits (Marks)</th>
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<tbody>
<tr>
<td><strong>Semester-III</strong></td>
<td>CCB-III (Section-A)</td>
<td>Theory Paper-VI: Plant Anatomy</td>
<td>03</td>
<td>45</td>
<td>10</td>
<td>40</td>
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<td></td>
<td>CCB-III (Section-B)</td>
<td>Theory Paper-VII: Plant Physiology</td>
<td>03</td>
<td>45</td>
<td>10</td>
<td>40</td>
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<tr>
<td><strong>Semester-IV</strong></td>
<td>CCB-IV (Section-A)</td>
<td>Theory Paper-VIII: Plant Embryology</td>
<td>03</td>
<td>45</td>
<td>10</td>
<td>40</td>
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<tr>
<td></td>
<td>CCB-IV (Section-B)</td>
<td>Theory Paper-IX: Plant Metabolism and Biochemistry</td>
<td>03</td>
<td>45</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td><strong>Annual Pattern</strong></td>
<td>CCBP-II</td>
<td>Practical Paper-X: Practicals based on CCB-III (Section-A) CCB-IV (Section-A)</td>
<td>03</td>
<td>16</td>
<td>10</td>
<td>40</td>
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<td></td>
<td>SEC-B</td>
<td>SEC- A OR B</td>
<td>45</td>
<td>25</td>
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<tr>
<td><strong>Annual Pattern</strong></td>
<td>CCBP-III</td>
<td>Practical Paper-XI: Practicals based on CCB-III (Section-B) CCB-IV (Section-B)</td>
<td>03</td>
<td>16</td>
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<td></td>
<td>SEC-B</td>
<td>SEC- II A OR B</td>
<td>03</td>
<td>45</td>
<td>25</td>
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<tr>
<td><strong>Total Credits Semester-III and IV</strong></td>
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<td>Marks: 60+50=110</td>
<td>Marks: 240+50=290</td>
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</tbody>
</table>

**ESE**: End Semester Examination, **CA**: Continues Assessment, **SECB**: Skill Enhancement Course Botany, **CCB**: Core Course Botany, **CCBP**: Core Course Botany Practical.

**Distribution of Credits**: 80% of the total credits for the ESE and 20% for CA

- **CA of 10 Marks (Theory)**: 05 Marks for test & 05 Marks for Assignment
- **CA of 10 Marks (Practicals)**: 05 Marks for test & 05 Marks for Record Book, Submission of collection and field note and Excursion Report.
- **CA of 25 Marks**: 15 Marks for Seminar & 10 Marks for Test
## An Outline:

<table>
<thead>
<tr>
<th>Semester/Annual</th>
<th>Course No</th>
<th>Name of the Course</th>
<th>Total Periods (Periods/Week)</th>
<th>Marks for Credits</th>
<th>External (ESE)</th>
<th>Internal (CA)</th>
<th>Credits (Marks)</th>
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<tbody>
<tr>
<td><strong>Semester-V</strong></td>
<td>DSEB-I</td>
<td><strong>Section - A</strong></td>
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<td>Cell Biology, Genetics &amp; Molecular Biology</td>
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<td><strong>Section - B</strong></td>
<td>Theory Paper-XIII:</td>
<td>45 (03/week)</td>
<td>10 Credits:02</td>
<td>(Marks: 50)</td>
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<td></td>
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<td></td>
<td>B I: Plant Pathology OR B II: Analytical Techniques in Plant Sciences OR B III: Herbal Drug Technology</td>
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<td><strong>Semester-VI</strong></td>
<td>DSEB-II</td>
<td><strong>Section - A</strong></td>
<td>Theory Paper-XIV:</td>
<td>45 (03/week)</td>
<td>10 Credits:02</td>
<td>(Marks: 50)</td>
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<td>Plant Breeding &amp; Biotechnology</td>
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<td><strong>Section - B</strong></td>
<td>Theory Paper-XV:</td>
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<td>10 Credits:02</td>
<td>(Marks: 50)</td>
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<td>B I: Plant Systematics OR B II: Research Methodology OR B III: Bioinformatics</td>
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<td><strong>Annual Pattern</strong></td>
<td>DSEBP-I</td>
<td><strong>Section - A</strong></td>
<td>Practical Paper XVI:</td>
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<td>(DSEB I &amp; II &amp; Section A)</td>
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<td>Practicals based on theory papers- XII &amp; XIV</td>
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<td><strong>SECB III</strong></td>
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<td><strong>Section - B</strong></td>
<td>SEC- III A Or B</td>
<td>01 Skill (03/week/ Batch)</td>
<td>25 Credits:02*</td>
<td>(Marks: 50)</td>
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<tr>
<td><strong>Annual Pattern</strong></td>
<td>DSEBP-II</td>
<td><strong>Section - A</strong></td>
<td>Practical Paper XVII:</td>
<td>16 Pract. (03/week/ Batch)</td>
<td>10 Credits:02</td>
<td>(Marks: 50)</td>
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<td>Practicals based on theory</td>
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<td>Section</td>
<td>papers- XIII &amp; XV</td>
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<td>SECB IV</td>
<td>SEC- IV A OR B</td>
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<td>01 Skill (03/week/Batch)</td>
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<td>Credits:02* (Marks: 50)</td>
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<td>Total Credits Semester –V &amp; VI</td>
<td>240+50 = 290</td>
<td>60+50 =110</td>
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<td>Credits:12+4* (Marks: 300+100* = 400)</td>
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**ESE**: End Semester Examination, **CA**: Continues Assessment, **SECB**: Skill Enhancement Course Botany, **DSEB**: Discipline Specific Elective Botany, **DSEBP**: Discipline Specific Elective Botany Practical

**Distribution of Credits**: 80% of the total credits for the ESE and 20% for CA

**CA of 10 Marks (Theory)**: 05 Marks for test & 05 Marks for Assignment

**CA of 10 Marks (Practicals)**: 05 Marks for test & 05 Marks for Record Book, Submission of collection and field note and Excursion Report.

**CA of 25 Marks**: 15 Marks for Seminar & 10 Marks for Test
Learning Objectives

1. To study and impart knowledge about the occurrence, distribution, structure and life history of lower plants such as algae, fungi, lichens
2. To instill in students an appreciation for the diversity of plant forms and structural organization that exists within plant bodies that allow plants to develop and live as integrated organisms in diverse environments

Learning outcomes:

1. Understand the morphology, structure and importance of the various organisms
2. Differentiate between various groups of Algae, Fungi, Bacteria, Viruses, and Lichens & Mycorrhiza
3. Learn the life cycles of individuals belonging to Algae, Fungi, Bacteria, Viruses, Lichens & Mycorrhiza

Unit I: Microbes (10 Lectures)

Viruses – Introduction, general characters of viruses, replication (general account), and RNA virus (TMV); Economic importance; study of yellow vein mosaic of Bhendi

Bacteria – Introduction, General characters and cell structure; Reproduction – vegetative, asexual (Binary Fission) and recombination (conjugation,) Study of Citrus Canker and Economic importance of Bacteria.
Unit II: Algae (12 Lectures)
Introduction, General characters, Ecology and distribution; Range of thallus organization and reproduction; Classification of algae (F. E. Fitch’s 1935); Morphology and life-cycles of the following: *Nostoc, Oedogonium* and *Ectocarpus*. Economic importance of algae

Unit III: Fungi (13 Lectures)
Introduction- General Characteristics, ecology and significance, cell wall composition, nutrition, reproduction and classification (Alexopolous & Mims 1979); General characteristics, ecology, significance and life cycle of, *Penicillium, Alternaria* (Deuteromycota), *Agaricus* (Basidiomycota).

Unit IV: Lichens and Mycorrhiza (10 Lectures)
Lichens: General characters, types and economic importance.
Mycorrhiza: General characters, ectomycorrhiza and endomycorrhiza and their significance

Theory paper-I: Viruses, Bacteria, Algae, Fungi, Lichens and Mycorrhiza

Unit wise distribution of periods and marks:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Title</th>
<th>Periods Allotted</th>
<th>Maximum Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Microbes</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>II</td>
<td>Algae</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>III</td>
<td>Fungi</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>IV</td>
<td>Lichens and Mycorrhiza</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45</td>
<td>112</td>
</tr>
</tbody>
</table>
Learning Objectives:
1. Acquainted with basic concepts of Ecology, Ecosystem Ecological factors, community ecology and phytogeography
2. To provide students with skills necessary for Ecological studies

Learning outcomes:
1. Able to understand the ecological principles, interactions taking place in the Ecosystems and the flow of energy
2. Learn about the concept of phytogeography and its relations with other disciplines

Unit I: Ecological Factors (10 Lectures)

Unit II: Ecological Adaptations (11 Lectures)
Morphological and anatomical adaptations in Hydrophytes (Hydrilla stem and Nymphaea petiole), Xerophytes (Nerium leaf and Casuarina stem). General characters of Halophytes and Epiphytes.

Unit III: Ecosystem and Plant Communities (12 Lectures)
Ecosystem: Introduction, Structure, types (Pond ecosystem and Forest ecosystem), Tropic levels, Energy flow in ecosystem, food chain, food web and ecological pyramids.
Community ecology: Community characteristics, Frequency, Density, Life forms and ecological succession (Hydrosere), Analysis of Plant communities (quadrant method).

**Unit IV: Phytogeography and Environmental Biology (12 Lectures)**

Introduction, Bio-geographical regions of India, Bio-diversity hot spots of India

Environmental pollution: Air, Water and soil pollution (Causes, effects and control measures), Soil erosion and soil conservation, afforestation , deforestation and Chipko movement, Environmental education and awareness.

**Theory paper-II: – Plant Ecology, Phytogeography and Environmental Biology**

Unit wise distribution of periods and marks:

<table>
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<tr>
<th>Unit</th>
<th>Title</th>
<th>Periods Allotted</th>
<th>Maximum Marks</th>
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<tbody>
<tr>
<td>I</td>
<td>Ecological Factors</td>
<td>10</td>
<td>28</td>
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<td>II</td>
<td>Ecological Adaptations</td>
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<td><strong>Total</strong></td>
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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Semester pattern curriculum under
Choice Based Credit System (CBCS) for
BOTANY
B.Sc. F.Y.
Semester – II
CCB-II (A)
Theory Paper –III
Bryophytes, Pteridophytes ,Gymnosperms & Paleobotany

Periods – 45
Credits :02
Maximum Marks – 50

Learning Objectives:
1. To study the occurrence, distribution, structure and life history of bryophytes, pteridophytes and gymnosperms
2. To provide students with skills in paleobotany studies

Learning outcomes:
1. Learn the life cycles of individuals belonging to Bryophytes, Pteridophytes and Gymnosperms
2. Learn about process of fossil formation and fossils plants

Unit I: Bryophytes (10 Lectures)
General characters, Classification (N.S.Parihar), morphology, anatomy and reproduction of Marchantia and Funaria. (Developmental study not expected), Economic importance of bryophytes.

Unit II: Pteridophytes (13 Lectures)
General characters, classification ( N.S.Parihar), morphology, anatomy and reproduction of Lycodium and Marsilea. (Developmental study not expected), Homospory, Heterospory and seed habit, stelar evolution, economical importance of Pteridophytes.

Unit III: Gymnosperms (12 Lectures)
Unit-IV: Paleobotany (10 Lectures)
Introduction to palaeobotany, process of plant fossilization, types of fossils, geological time scale, Study of fossil Gymnosperms- *Lyginopteris oldhamia* (stem), *Bennettites* (flower) and General characters of *Ginkgo* (A living fossil).

Theory paper-III: –Bryophytes, Pteridophytes Gymnosperms & Paleobotany
Unit wise distribution of periods and marks:

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<tr>
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<td>Paleobotany</td>
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Semester pattern curriculum under Choice Based Credit System (CBCS) for
BOTANY
B.Sc. F.Y.
Semester – II
CCB-II (B)
Theory Paper –IV
Taxonomy of Angiosperms

Periods – 45 Credits: 02
Maximum Marks – 50

Learning Objectives:

1. To study the types of classifications- artificial, Natural and phylogenetic
2. To study the principles and rules of ICN and taxonomical terminology
3. To study the various plant families and their economic importance

Learning Outcomes:

1. Proficiency with the basic terminology of plant morphology
2. Able to identify the major families of plants and their economic importance
3. Understand the methods of collecting and preserving plants

Unit I: Introduction (10 Lectures)
Aims of Taxonomy, Principles of Taxonomy, Identification, Nomenclature and Classification, Principles and rules of ICN (Rank of taxa, typification, author citation) Importance of Herbarium, important herbaria and botanical gardens of the India.

Unit II: Plant Classification (11 Lectures)
Taxonomic hierarchy,Types of classification-artificial, natural and phylogenetic. Bentham and Hooker, Engler and Prantl (up to family level with reference to families mentioned in the syllabus).

Unit III: Morphology of Angiosperms (12 Lectures)
Root: Definition, characters, types (tap root and adventitious) and functions. Stem: Definition, characters and functions. Leaf: Definition, structure of typical leaf (Hibiscus), functions, types-Simple (Hibiscus), Compound (unipinnate, bipinnate, tripinnate, unifoliolate, bifoliolate, trifoliolate, multifoliolate), venation- definition, types (reticulate, parallel), Phyllotaxy. Inflorescence: Definition, types- Racemose (characters), Cymose (characters). Flower: Definition, symmetry, actinomorphic,
zygomorphic, types (hypogynous, epigynous, perigynous), structure of typical flower (Hibiscus),
calyx (polysepalous, gamosepalous), corolla (polypetalous, gamopetalous), Androecium (parts of a
stamen), Gynoecium – structure of carpel, apocarpous, syncarpous, placentation (axile, parietal, free
central, marginal, basal) Fruit: Definition, forms- simple (dry, legume, fleshy, berry), aggregate
(Etario of berries), composite (Sorosis).

Unit IV: Study of Plant Families (12 Lectures)
Study of vegetative and floral characters of following families: Brassicaceae, Fabaceae, Solanaceae,
Lamiaceae and Poaceae.

Theory paper-III: – Taxonomy of Angiosperms

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<td>28</td>
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<td></td>
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Practical Exercise:

1. Study of morphology of Bacteria by Gram staining method
2. Study of citrus canker disease
3. Study of symptoms of yellow vein mosaic of Bhendi
4. Study of Algae: Systematic position and external features of *Nostoc*, *Oedogonium*, *Ectocarpus*
5. Study of Fungi: systematic position, external and internal features of *Penicillium*, *Alternaria*, *Agaricus*
6. Study of different forms of Lichens
7. Study of ectomycorrhiza and endomycorrhiza
8. Study of *Marchantia*: morphology of thallus, w.m. rhizoids and scales, v.s. thallus through gemma cup, w.m. gemmae (all temporary slides), v.s. antheridiophore, archegoniophore, L.S. of sporophyte (all permanent slides)
9. Study of *Funaria*: morphology, w.m. leaf, rhizoids, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridial and archegonial heads, L.S. of capsule and protonema
10. *Lycopodium*: morphological and anatomical study
11. *Marsilea*: morphological and anatomical study of petiole and rhizome
13. *Pinus*: morphology (long and dwarf shoots, w.m. dwarf shoot, male and female cone)
14. Study of fossil Plants
15. Estimation of soil Bulk density and porosity
16. Study of morphological and anatomical adaptations of hydrophytes (*Hydrilla* stem and *Nymphaea* petiole) and xerophytes (*Nerium* leaf and *Casuarina* stem)

17. Determination of dissolved oxygen (DO) in water samples

18. Determination of minimal quadrat size for the study of herbaceous vegetation in the college campus

19. Quantitative analysis of herbaceous vegetation in the college campus

20. Study of vegetative and floral characters of the following families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker’s system of classification):
   - Brassicaceae, Fabaceae, Solanaceae, Lamiaceae, Poaceae.

21. Excursion/study tour for plant specimen collection
Text Books:

• Rangaswamy, G. (1972) Diseases of Crop Plants in India. Prentice Hall of India P Ltd.
• Raychudhuri, S.P 1991. (Ed.) Recent advances in Medicinal aromatic and spice crops Vol.1 Today & Tomorrow’s printers and publishers, New Delhi.
• Hill M. K. 1977, Understanding Environmental Pollution. Cambridge University Press. U.K.
• Cain, S.A. (1944) – Foundation of Plant Geography – Harper & Brothers, N.Y.
• Polunin, N. 1992 Principles of Plant Geography.
• Ambasht, R.S. 1990. Environment Pollution.
• Chacho, 1985. Sampling techniques.
• Jain Mehra. 1983. Conservation of Tropical resources.
Q1. Essay Type Question    15 marks
   OR
   a) Short Question     08 marks
   b) Short Question     07 marks
   (Based On Unit I, II)

Q2. Essay Type Question    15 marks
   OR
   a) Short Question     08 marks
   b) Short Question     07 marks
   (Based On Unit III & IV)

Q3. Write short notes on any two of the following (Each of 05 Marks)   10 marks
   a) 
   b) 
   c) 
   d) 
   (Based on all Units)
Q1. Identify, classify and describe the given specimen –A (Two Algae from Mixture / Fungi) on the basis of external and internal characters.

(The specimen A may be given alternately to the students) 15 Marks

Q2. Identify, classify and describe the given specimen –B (Bryophyta / Pteridophyta/ Gymnosperms) on the basis of external and internal characters.

(The specimen B may be given alternately to the students) 15 Marks

Q3. Make a temporary preparation of the given specimen C. Identify and describe its internal structure of ecological interest. (Hydrilla stem/ Nymphaea petiole/ Casuarina stem / Nerium leaf.

(Specimen C may be given alternately to the students) 15 Marks

Q4. Describe, Identify and classify the given plant specimen D with floral formula and floral diagram (flowering twig of easily available plant for specimen D may be given alternately to the students)

15 Marks

Q.5 Spotting (Identify and describe the spots-A, B, C, D and E as per the given instructions)

(A- Algae / Fungi, B- Bryophyta/Pteridophyta/Gymnosperms/Fossil Specimen, C- Ecology, D& E – Taxonomy/ morphology of families of flowering plants.)

10Marks

Q.6. Visit/ Excursion reports 05 Marks

Q.7. Viva- Voce 05 Marks

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