### Syllabus Revised By

**Board of Studies in Botany**  
Periyar University  
**(W.e.f. 2014-2015)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Department</th>
<th>University</th>
<th>Address</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dr. S. MURUGESH</strong></td>
<td>Professor &amp; Head</td>
<td>Department of Botany</td>
<td>Periyar University</td>
<td>Periyar Palkalai Nagar</td>
<td>Salem – 636 011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dr. K. SELVAM</strong></td>
<td>Associate Professor</td>
<td>Department of Botany</td>
<td>Periyar University</td>
<td>Periyar Palkalai Nagar</td>
<td>Salem – 636 011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dr. S. KANNAN</strong></td>
<td>Professor &amp; Head</td>
<td>Department of Zoology</td>
<td>Periyar University</td>
<td>Periyar Palkalai Nagar</td>
<td>Salem – 636 011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dr. S. LALITHA</strong></td>
<td>Assistant Professor</td>
<td>Department of Botany</td>
<td>Periyar University</td>
<td>Periyar Palkalai Nagar</td>
<td>Salem – 636 011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dr. A. MARUTHUPANDIAN</strong></td>
<td>Assistant Professor</td>
<td>Department of Botany</td>
<td>Periyar University</td>
<td>Periyar Palkalai Nagar</td>
<td>Salem – 636 011</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dr. K. ARUMUGAM</strong></td>
<td>Professor of Botany,</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annamalai University</td>
<td></td>
<td></td>
<td>Annamalai Nagar – 608 002</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dr. K. MANOHARAN</strong></td>
<td>Professor &amp; Head</td>
<td>Department of Plant Morphology &amp; Algalogy</td>
<td>School of Biological Science</td>
<td>Madurai Kamaraj University</td>
<td>Madurai – 625 021</td>
</tr>
</tbody>
</table>
## CONTENTS

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Contents</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>I. Regulations and Scheme</strong></td>
<td>05</td>
</tr>
<tr>
<td>2</td>
<td>1. Eligibility for Admission</td>
<td>06</td>
</tr>
<tr>
<td>3</td>
<td>2. Mode of Selection</td>
<td>06</td>
</tr>
<tr>
<td>4</td>
<td>3. Duration of the Course</td>
<td>06</td>
</tr>
<tr>
<td>5</td>
<td>4. Distribution of Credit Points</td>
<td>06</td>
</tr>
<tr>
<td>6</td>
<td>5. Course of Study</td>
<td>07</td>
</tr>
<tr>
<td>7</td>
<td>5.1. The component of Internal Examination</td>
<td>07</td>
</tr>
<tr>
<td>8</td>
<td>5.2. Theory core paper</td>
<td>07</td>
</tr>
<tr>
<td>9</td>
<td>5.3. Practical – Internal and External</td>
<td>07</td>
</tr>
<tr>
<td>10</td>
<td>5.4. Marks allotment for Attendance</td>
<td>07</td>
</tr>
<tr>
<td>11</td>
<td>6. Details of Project marks</td>
<td>08</td>
</tr>
<tr>
<td>12</td>
<td>7. Question Paper pattern</td>
<td>08</td>
</tr>
<tr>
<td>13</td>
<td>8. Passing Minimum</td>
<td>08</td>
</tr>
<tr>
<td>14</td>
<td>9. Classification of Successful Candidates</td>
<td>08</td>
</tr>
<tr>
<td>15</td>
<td>10. Seven Point Scale Grading System</td>
<td>09</td>
</tr>
<tr>
<td>16</td>
<td>11. Tour Programme</td>
<td>09</td>
</tr>
<tr>
<td>17</td>
<td>12. Elective Course</td>
<td>09</td>
</tr>
<tr>
<td>18</td>
<td>13. Supportive Course</td>
<td>09</td>
</tr>
<tr>
<td>19</td>
<td><strong>II. Course Structure</strong></td>
<td>10-11</td>
</tr>
<tr>
<td>20</td>
<td><strong>III. Detailed Syllabus</strong></td>
<td>12</td>
</tr>
<tr>
<td>21</td>
<td><strong>Semester I</strong></td>
<td>13</td>
</tr>
<tr>
<td>22</td>
<td>Core Course I</td>
<td>14</td>
</tr>
<tr>
<td>23</td>
<td>Core Course II</td>
<td>17</td>
</tr>
<tr>
<td>24</td>
<td>Core Course III</td>
<td>19</td>
</tr>
<tr>
<td>25</td>
<td>Core Course IV</td>
<td>22</td>
</tr>
<tr>
<td>26</td>
<td>Core Course V</td>
<td>24</td>
</tr>
<tr>
<td>27</td>
<td><strong>Semester II</strong></td>
<td>26</td>
</tr>
<tr>
<td>28</td>
<td>Core Course VI</td>
<td>27</td>
</tr>
<tr>
<td>29</td>
<td>Core Course VII</td>
<td>30</td>
</tr>
<tr>
<td>No.</td>
<td>Course Name</td>
<td>Page</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>30</td>
<td>Core Course VIII</td>
<td>32</td>
</tr>
<tr>
<td>31</td>
<td>Core Course IX</td>
<td>35</td>
</tr>
<tr>
<td>32</td>
<td>Core Course X</td>
<td>37</td>
</tr>
<tr>
<td>33</td>
<td><strong>Semester III</strong></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Core Course XI</td>
<td>40</td>
</tr>
<tr>
<td>35</td>
<td>Core Course XII</td>
<td>42</td>
</tr>
<tr>
<td>36</td>
<td>Core Course XIII</td>
<td>44</td>
</tr>
<tr>
<td>37</td>
<td><strong>Semester IV</strong></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Core Course XIV</td>
<td>46</td>
</tr>
<tr>
<td>39</td>
<td><strong>Elective Course</strong></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>1. Herbal Technology</td>
<td>50</td>
</tr>
<tr>
<td>41</td>
<td>2. Fungal Biotechnology</td>
<td>52</td>
</tr>
<tr>
<td>42</td>
<td>3. Mushroom Technology</td>
<td>54</td>
</tr>
<tr>
<td>43</td>
<td>4. Cytogenetics and Plant Breeding</td>
<td>56</td>
</tr>
<tr>
<td>44</td>
<td>5. Biofertilizers Technology</td>
<td>58</td>
</tr>
<tr>
<td>45</td>
<td>6. Marine Botany</td>
<td>60</td>
</tr>
<tr>
<td>46</td>
<td><strong>Supportive Course</strong></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>1. Bioremediation and Phytoremediation</td>
<td>63</td>
</tr>
<tr>
<td>48</td>
<td>2. Marine Natural Resources</td>
<td>65</td>
</tr>
<tr>
<td>49</td>
<td>3. Forest Ecology and Conservation</td>
<td>66</td>
</tr>
<tr>
<td>50</td>
<td>4. Horticulture and Gardening</td>
<td>68</td>
</tr>
</tbody>
</table>
Regulations & Scheme
1. **Eligibility for Admission:**

Candidate who has passed the B.Sc., degree in Botany/Plant Science/Life Sciences of the University or an Examination of any other University accepted by the Syndicate as equivalent thereto shall be eligible for admission to M.Sc., Degree of this University or any other University recognised by the Syndicate as equivalent thereto shall be eligible to register for the Degree of Master in Botany (M.Sc.,) and undergo the prescribed course of study in an approved department of this University.

2. **Mode of Selection:**

Applicants have to be selected through entrance examination and also as per the norms of Tamil Nadu Government.

3. **Duration of the Course:**

The duration of the M.Sc., Degree shall be two years consist of four semesters under Choice Based Credit System.

4. **Distribution of Credit Points:**

The minimum credit requirement for M.Sc., Degree shall be 90 Credits. The break-up of credits for the programme is as follows;

<table>
<thead>
<tr>
<th>Course</th>
<th>Course Title</th>
<th>No. Of Courses</th>
<th>Hours/Week</th>
<th>Maximum Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Course</td>
<td>Theory and Practical</td>
<td>14</td>
<td>73</td>
<td>1400</td>
<td>67</td>
</tr>
<tr>
<td>Core Course</td>
<td>Project</td>
<td>01</td>
<td>15</td>
<td>200</td>
<td>07</td>
</tr>
<tr>
<td>Elective</td>
<td>Major Based Elective Course (I &amp; II Semester)</td>
<td>02</td>
<td>08</td>
<td>200</td>
<td>08</td>
</tr>
<tr>
<td>Supportive</td>
<td>Supportive Course (II &amp; III Semester)</td>
<td>02</td>
<td>08</td>
<td>200</td>
<td>08</td>
</tr>
</tbody>
</table>

| Total       |                                      | 19             | 104        | 2000          | 90     |
5. Course of Study:

The course of study for the M.Sc., Degree shall be in Botany (CBCS) with internal assessment according to syllabi prescribed from time to time.

5.1 The component of Internal Examination;

<table>
<thead>
<tr>
<th>Internal Tests (Best of two out of 3)</th>
<th>10 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seminar</strong></td>
<td>05 Marks</td>
</tr>
<tr>
<td><strong>Assignment</strong></td>
<td>05 Marks</td>
</tr>
<tr>
<td><strong>Attendance</strong></td>
<td>05 Marks</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25 Marks</strong></td>
</tr>
</tbody>
</table>

The allotment of marks and Scheme of examination as follows;

5.2 Theory Core Paper

<table>
<thead>
<tr>
<th></th>
<th>External 75 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal</strong></td>
<td>25 Marks</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 Marks</strong></td>
</tr>
</tbody>
</table>

Duration of examination 3 Hours

5.3 Practical Internal & External

<table>
<thead>
<tr>
<th>Model Practical</th>
<th>35 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Record</strong></td>
<td>05 Marks</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40 Marks</strong></td>
</tr>
<tr>
<td><strong>External</strong></td>
<td>60 Marks</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 Marks</strong></td>
</tr>
</tbody>
</table>

5.4 Marks allotment for attendance as follows;

<table>
<thead>
<tr>
<th>% of attendance</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>100% - 91%</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>90% - 81%</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>80% - 71%</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>70% - 61%</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Below 60%</strong></td>
<td>No marks</td>
</tr>
</tbody>
</table>
6. Details of Project Marks;

<table>
<thead>
<tr>
<th>Submission of Dissertation</th>
<th>100 Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vivo-voce</td>
<td>50 Marks</td>
</tr>
<tr>
<td>Internal marks</td>
<td>50 Marks</td>
</tr>
</tbody>
</table>

The marks should be provided by Internal Examiner only (Supervisor of the student)

| Total                       | 200 Marks |

7. Question paper Pattern:

Time: 3 Hrs. Maximum Marks: 75

PART – A (5X5=25 Marks)
Answer All Questions (Two questions from each unit with internal choice).

PART – B (5X10=50 Marks)
Answer All Questions (Two questions from each unit with internal choice).

8. Passing Minimum:

- There shall be no Passing Minimum for Internal.
- For External Examination, Passing Minimum shall be of 50% (Fifty Percentage) of the maximum marks prescribed for the paper.
- In the aggregate (External + Internal) the passing minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- Grading shall be based on overall marks obtained (internal + external).

9. Classification of Successful Candidates

<table>
<thead>
<tr>
<th>75% and above</th>
<th>First Class with Distinction</th>
</tr>
</thead>
<tbody>
<tr>
<td>60% to 74%</td>
<td>First Class</td>
</tr>
<tr>
<td>Below 60%</td>
<td>Second Class</td>
</tr>
</tbody>
</table>
10. Seven point scale Grading System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade point</th>
<th>Percentage Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>`O' = Outstanding</td>
<td>5.50 - 6.00</td>
<td>75 - 100</td>
</tr>
<tr>
<td>`A' = Very Good</td>
<td>4.50 - 5.49</td>
<td>65 - 74</td>
</tr>
<tr>
<td>`B' = Good</td>
<td>3.50 - 4.49</td>
<td>55 - 54</td>
</tr>
<tr>
<td>`C' = Average</td>
<td>3.00 - 3.49</td>
<td>50 - 54</td>
</tr>
<tr>
<td>`D' = Below Average</td>
<td>1.50 - 2.99</td>
<td>35 - 49</td>
</tr>
<tr>
<td>`E' = Poor</td>
<td>0.50 - 1.49</td>
<td>25 - 34</td>
</tr>
<tr>
<td>`F' = Fail</td>
<td>0.00 - 0.49</td>
<td>0 - 24</td>
</tr>
</tbody>
</table>

Tour Programme:

As per Part of M.Sc., Botany Degree students shall undertake a tour and field study of different types of vegetation, ecosystems etc., under the guidance of faculty members not less than 4-5 days.

Elective courses:

The University Department of Botany offers following Elective course subjects.

- Herbal Technology
- Fungal Biotechnology
- Mushroom Technology
- Cytogenetics and Plant Breeding
- Biofertilizers Technology
- Marine Botany

Supportive Courses:

The University Department of Botany offers following Supportive course subjects to other Department students.

- Bioremediation and Phytoremediation
- Forest Ecology And Conservation
- Horticulture and Gardening
- Marine Natural Resources
## DEPARTMENT OF BOTANY
### PERIYAR UNIVERSITY
#### SALEM – 11

**PG Programme M.Sc., Botany – Course Structure**

(Applicable to the candidates admitted from the academic year 2014-2015 onwards)

<table>
<thead>
<tr>
<th>Semester</th>
<th>Core Course</th>
<th>Paper Code</th>
<th>Subject</th>
<th>Hrs/Week</th>
<th>Credits</th>
<th>CIA</th>
<th>EA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>I</td>
<td>14PBOTCT01</td>
<td>Plant Diversity : I: Algae, Fungi, Lichens and Bryophytes</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>14PBOTCT02</td>
<td>Plant Diversity : II: Pteridophytes, Gymnosperms and Paleobotany</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>III</td>
<td>14PBOTCT03</td>
<td>Plant Anatomy, Microtechnique &amp; Embryology</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>IV</td>
<td>14PBOTCT04</td>
<td>Plant Ecology and Phytogeography</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>14PBOTCP01</td>
<td>Practical - I (Core I, II, III &amp; IV)</td>
<td>6</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>ELE-I</td>
<td>14PBOTE01</td>
<td>Elective - 1</td>
<td>4</td>
<td>4</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>VI</td>
<td>14PBOTCT05</td>
<td>Taxonomy of Angiosperms and Economic Botany</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>VII</td>
<td>14PBOTCT06</td>
<td>Plant Physiology &amp; Biochemistry</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>VIII</td>
<td>14PBOTCT07</td>
<td>Biological Techniques</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>IX</td>
<td>14PBOTCT08</td>
<td>Cell Biology, Genetics &amp; Molecular Biology</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>X</td>
<td>14PBOTCP02</td>
<td>Practical - II (Core VI, VII, VIII &amp; IX)</td>
<td>6</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>ELE-II</td>
<td>14PBOTE02</td>
<td>Elective - 2</td>
<td>4</td>
<td>4</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>SUP.-I</td>
<td>14PBOTS01</td>
<td>Supportive - 1</td>
<td>4</td>
<td>4</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>XI</td>
<td>14PBOTCT09</td>
<td>Microbiology &amp; Plant pathology</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>XII</td>
<td>14PBOTCT10</td>
<td>Plant Biotechnology &amp; Genetic Engineering</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>XIII</td>
<td>14PBOTCP03</td>
<td>Practical - III (Core IX, X &amp; XI)</td>
<td>6</td>
<td>4</td>
<td>40</td>
<td>60</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>SUP.-II</td>
<td>14PBOTS02</td>
<td>Supportive - 2</td>
<td>4</td>
<td>4</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>XIV</td>
<td>14PBOTCT11</td>
<td>Research Trends in Botany</td>
<td>5</td>
<td>5</td>
<td>25</td>
<td>75</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>PRO.</td>
<td>14PBOTPR01</td>
<td>Project Work</td>
<td>15</td>
<td>7</td>
<td>50</td>
<td>15</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>90</strong></td>
<td></td>
<td><strong>100</strong></td>
<td><strong>2000</strong></td>
<td></td>
</tr>
</tbody>
</table>

ELE – Elective; SUP –Supportive; PRO-Project.
Detailed Syllabus
Semester - I

Core Course - Theory

- Plant Diversity – I: Algae, Fungi, Lichens and Bryophytes
- Plant Diversity II: Pteridophytes, Gymnosperms and Paleobotany
- Plant anatomy, Microtechnique and Embryology
- Plant Ecology and Phytogeography

Core Course Practical - 01
Unit I:


Unit II:


Unit III:


Unit IV:


Unit V:

References:

**Algae:**

**Fungi:**

**Lichens:**

Bryophytes:

UNIT – I


UNIT - II


UNIT – III


UNIT – IV

Comparative study of vegetative, anatomy and reproductive structure of Ginkgoales and Gnetales. Economic importance of gymnosperms.

UNIT – V

References

Text Books

Reference Books
- Bower F.O. 1963. The Ferns
Unit I: Plant Anatomy I


Unit II: Plant Anatomy II


Unit III: Plant Microtechnique


Unit IV: Embryology I

Unit V: Embryology II


References

PLANT ANATOMY


MICROTECHNIQUE

EMBRYOLOGY:

- Maheswari, P. 1950. An introduction to the embryology of Angiosperms
- Maheswari, P. 1963. Recent advances on the embryology of Angiosperm
PLANT ECOLOGY AND PHYTOGEOGRAPHY

Unit I


Unit II


Unit III


Unit IV


Unit V

References:

Text Books:


Reference Books:

- Conard, H.S. Plant Ecology - Iowa state Press., Iowa.
ALGAE:

- Morphology and internal structures of vegetative and reproductive organs in the genera *Choleralla, Padina, Gelidium, Anabaena and Vaucheria*.

- Prepare and submit 15 herbarium sheets (Seaweeds) in the course of field study and education tour.

FUNGI:

- Study of diagnostic features of the following types of fungi - *Phytophthora, Albugo, Mucor, Aspergillus, Penicillium, Pilobolous, Saccharomyces, Xylaria, Peziza, Puccinia, Pleurotus, Auricularia, Polyporus, Fusarium, Alternaria, Parmelia, and Usnea*.

LICHENS (Slides):

- Study of Morphology and anatomical features of foliose, crustose and fruticose lichens through permanent slides

BRYOPHYTES:

- Study of morphology and internal structures of vegetative and reproductive organs in the genera *Marchantia, Porella, Fossombronia, Anthoceros and Moss*.

PTERIDOPHYTES:

Study of vegetative, anatomy and reproductive structure of *Selaginella, Ophioglossum Equisetum, Gleichenia, Marselia* and *Azola*.

GYMNOSPERMS:

Study of morphology, anatomy and reproductive structures of *Araucaria, Cupressus, Podocarpus, Ginkgo, Taxus, Ephedra* and *Gnetum*.
PALAEOBOTANY (SLIDES):
Study of salient features of *Lepidodendron*, *Lepidocarpon*, *Cleichenites*, *Williamsonia*, *Calamites*, *Sphenophyllum*, *Glossopteris* and *Cycads* through Permanent Slides.

PLANT ANATOMY & MICROTECHNIQUE:
- Study the structures of various Microscopes
- Study the structure of Microtome
- Staining methods (Simple/Permanent)
- Student should submit Two number of Permanent slides for practical Examination
- Study the anomalous, primary and secondary features in selected Monocot and Dicot plants
- Detailed study of TS, TLS and RLS from various wood for to identify the soft and hard wood
- Study the anatomical abnormality of C4 and CAM plants (Leaf/Stem).

EMBRYOLOGY:
- Study of pollen morphology
- Pollen germination experimental study
- Identify the different types of embryos, polyembryony, endosperm types, types of pollen grains.
- Any stage of embryo excision from Cucumber seeds.

PLANT ECOLOGY:
- Determination of linear changes in vegetation by using line and belt transect methods.
- Determination of frequency, density, abundance, dominance, FICC, dominance index, similarity index and diversity index by using quadrate frame.
- To find out the bulk density of a given soil sample
- To study soil density and porosity

PHYTOGEOGRAPHY:
- To determine the vegetational cover in a given area
- To prepare list of Endangered, Endemic and threatened species in a Selected areas.
Semester - II

Core Course - Theory

- Taxonomy of Angiosperms and Economic Botany
- Plant Physiology and Biochemistry
- Cell Biology, Genetics and Molecular Biology
- Biological Techniques

Core Course Practical - 02
Periyar University – M.Sc., Botany - Syllabus 2014 Onwards

SEMESTER – II
CORE COURSE - VI

TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

<table>
<thead>
<tr>
<th>Paper Code</th>
<th>14PBOTCT05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits</td>
<td>5</td>
</tr>
<tr>
<td>Marks</td>
<td>25+75=100</td>
</tr>
<tr>
<td>Hours</td>
<td>5/Week</td>
</tr>
</tbody>
</table>

Unit – 1


Unit – 2


Unit – 3

Study of diagnostic characters of the following family Magnoliaceae, Mesnispermaceae, Polygalaceae, Caryophyllaceae, Oxalidaceae, Meliaceae, Rhamnaceae, Vitaceae, Sapindaceae, Combretaceae, Lythraceae and Aizoaceae..

Unit – 4

Study of diagnostic characters of Rubiaceae, Oleaceae, Gentianaceae, Boraginaceae, Bignoniaceae, Podestemaceae, Loranthaceae, Orchidaceae, Liliaceae, Commelinaceae, Musaceae, Arecaceae, Cyperaceae and Poaceae,.

Unit – 5

Economic importance of Cereals - Wheat, Rice, Maize, Sorghum, Barley. Legumes:; Black gram, Red gram, Chick pea, Pigeon pea. Fruits:

References

Text Books


Reference Books


Unit - I

Water Potential - biological significance, water relationship of the plants, osmosis, permeability, diffusion, chemical potential, water potential, apoplastic and symplastic concept, SPAC. Translocation of solutes.

Unit – II


Unit – III


Unit – IV

Unit - V


References

Text Books

Reference Books
SEMESTER – II
CORE COURSE - VIII
BIOLOGICAL TECHNIQUES

Unit I

General Principles of Biochemical analysis – Principles and Methodology of Colorimetry, Spectrophotometry, pH meter and Centrifugation techniques.

Unit II


Unit III

Techniques in Molecular Biology – Nucleic Acids – Isolation and Purification – Southern, Western and Northern hybridization Techniques – Colony hybridization – Polymerase Chain Reaction – Genome mapping – Molecular Markers – RFLP, RAPD and AFLP.

Unit IV

Microbiological and Biotechnolgical techniques – Microbe and Plant Tissue – Media preparation (PDA, Nutrient Agar, CHU-10) – Bold basal medium (MS medium, Gamborg medium) – Sterilization techniques – Cytological techniques – Pretreatment, Fixatives and Stains.

Unit V

Taxonomical and Phytochemical techniques – Herbarium Methods – Monographs, Flora and Vegetation Studies – Botanical Nomenclature – Phytogeography of India. Phytochemistry- Phytochemicals – Extraction,
isolation, Characterization and identification of Terpenes, Alkaloids and Flavonoids.

References:


Unit – I

The plant cell: Structure and function of cell wall, membrane, chloroplast, mitochondria, ribosomes, peroxisomes, golgi apparatus, nucleus, nucleolar organizer and ER. Cell cycle – mitosis and meiosis, pairing, crossing over and cytokinesis.

Unit - II


Unit – III


Unit – IV


Unit – V


References

Text Books


Reference Books


Hartk D.L and Jones, E.W 1998 Genetics: Principles and Analysis (Fourth Edition). Jones and Bartlett Publishers, Massachusetts, USA.


SEMMTER – II
CORE COURSE - X
PRACTICAL - 02

TAXONOMY OF ANGIOSPERMS,
ECOLOGICAL BOTANY, PLANT PHYSIOLOGY, BIOCHEMISTRY,
BIOLICAL TECHNIQUES, CELL BIOLOGY, GENETICS AND
MOLECULAR BIOLOGY

TAXONOMY OF ANGIOSPERMS:
- Study the taxonomical descriptions for all plant parts Root, Stem,
  Leaves, Flowers, Fruits and seeds.
- Study of the morphological and floral characteristic and economic
  importance of Magnoliaceae, Mesnispermaceae, Polygalaceae,
  Caryophyllaceae, Oxalidaceae, Meliaceae, Rhamnaceae, Vitaceae,
  Sapindaceae, Combretaceae, Lythraceae, Aizoaceae, Rubiaceae,
  Oleaceae, Gentianaceae, Boraginaceae, Bignoniaceae, Podestemaceae,
  Loranthaceae, Orchidaceae, Liliaceae, Commelinaceae, Musaceae,
  Arecaaceae, Cyperaceae, Poaceae.
- Preparation of Artificial keys
- Herbarium techniques and preparation and submission of 50
  herbarium
- Floristic study of selected area

ECOLOGICAL BOTANY
- To study the economic importance of Cereals, Legumes, Fruits, Spices
  and Condiments, Fibres, Timber and Vegetable Oil.

PLANT PHYSIOLOGY & BIOCHEMISTRY
- Extraction and estimation of chlorophyll a, b and carotenoids in C₃
  and C₄ plants by Arnon (1949).
- Leaf anatomy of C₃ and C₄ plants
- Preparation of buffers – Phosphate and Citrate buffers.
- Preparation of the standard curve of protein (BSA).
- Separation of amino acids by chromatography.
- Separation of amino acids by Thin Layer Chromatography.
• Estimation of reducing and non reducing sugars by Nelson’s method (1994).
• Estimation of soluble starch by Hansen and Moller (1975).
• Estimation of soluble protein by Lowry’s method (1951).
• Estimation of free amino acids by Bates and Waldren (1973).
• Estimation of lipid by volumetric method.
• Determination of catalase and peroxidase activity by Chance and Maehly (1955).

**BIOLOGICAL TECHNIQUES**

• Hands on experience in the use of instruments like Spectrophotometer, pH meter, Centrifuge, Thin layer chromatography, Agarose gel electrophoresis, PAGE and PCR
• Extraction methods of plant samples
• Qualitative tests for the identification of terpenes, alkaloids and flavonoids

**CELL BIOLOGY, GENETICS AND MOLECULAR BIOLOGY**

• Karyotyping of monocot (mitosis).
• Karyotyping of dicot (mitosis).
• Induced aberration of chromosomes
• Genetic cross analysis monohybrid and dihybrid, test cross, back cross
• Isolation of plant genomic DNA.
• Analysis of nuclear DNA by agarose gel electrophoresis.
• Demonstration of PCR
Semester - III

Core Course - Theory

- Microbiology and Plant pathology
- Plant Biotechnology and Genetic Engineering

Core Course Practical - 03
Unit I
Microbiology – Scope and History – Characterization, Classification and Identification of Microorganisms – Morphology, Structure, Nutrition and growth of Bacteria – Metabolism, Cultivation, Reproduction, Pure culture, cultural Characteristic of Bacteria.

Unit II

Unit III
A Brief account on Microalgae and Microfungi – Their role in Microbiology - Microbial genetics – Microorganisms in Environment (Soil, Air and Water) – Microorganisms in Industry, Agriculture and Food – Microorganisms in human diseases – Basic methods in Microbiology.

Unit IV
Plant Pathology – Introduction – History – Plant Diseases their nature, Classification and Importance – Disease caused by fungi (Blast of paddy, Red rot of Sugarcane) – Bacteria (Blight of paddy, Black arm of Cotton) Virus (Bunchy top of Banana & TMV) – Mycoplasma (little Leaf diseases) – A brief account on Nematodes and Phytoplasma – Non-Parasitic diseases.

Unit V
References:

**Microbiology:**


**Plant Pathology:**

Unit I


Unit II


Unit III


Unit IV

Tools of Genetic engineering – Restriction types of Enzymes (Exo and Endo nucleases) – Different types of enzymes used in Genetic engineering (Methylase, SI nuclease, Ligase, Alkaline Phosphatse, Reverse transcriptase, T4 kinase, Terminal transferase, adopters and Linkers) – Vectors and their types – Plasmid (pBR 322, pUC Vectors), Agrobacterium based Plasmids, Bacteriophage vectors, Cosmids, Phagemids, YAC, CaMV, Gemini Virus, Shuttle and Expression vectors.

Unit V

References:

Microbiology:

- Cleaning and Sterilization of Glassware
- Preparation of culture media
- Sterilization techniques
- Serial dilution techniques – Pure culture (Pour/Streak/Spread)
- Differential staining methods of bacteria by using Gram stain.
- Antibacterial assay - disc diffusion/agar well method.

Plant Pathology:

- Isolation of pathogens from diseased tissues (leaf, stem and fruit) by serial dilution method.
- Symptoms and identification of diseases caused by fungi (Blast of paddy, red rot of sugar cane), Bacteria (Blight of paddy, Black arm of Cotton) Virus (Bunchy top of Banana & TMV), – Mycoplasma (little Leaf diseases).
- Isolation of pathogenic microorganisms from infected tissues
- Collection and preservation of specimens from infected plants.
- Calculation of Spore load on seeds using Haemocytometer

Plant Biotechnology:

- Preparation of media for plant tissue culture
- Sterilization, inoculation and incubation of explants
- Isolation of protoplasts
- Protoplast fusion
- Callus induction in Carrot

Genetic Engineering:

- Isolation of DNA from Plants
- Principles and applications of agarose gel electrophoresis
Semester - IV

Core Course - Theory

- Recent Trends in Botany
RESEARCH TRENDS IN BOTANY

Unit I


Unit II

Bioinformatics and Computational Biology – Introduction, aim and importance of bioinformatics – Database and Mining – Genomics, Transcriptomics and Metabolomics - primary and secondary databases DNA sequence databases - Gen bank: a practical approach – Phylogenetic analysis (PHYLP, TREE) DNA databank, Nucleotide sequence databank (EMBI Bank) -Sequence alignment.

Unit III


Unit IV

Unit V


Biostatistics - Methods of collection and classification of data; Primary and secondary data, qualitative and quantitative data. Frequency distribution, graphical representation, normal distribution - Mean - Median and Mode - Mean deviation, Standard deviation, variance, standard error, co-efficient of variation - Linear regression and correlation (simple and multiple).

References:

Elective Course

- Herbal Technology
- Fungal Biotechnology
- Mushroom Technology
- Cytogenetics and Plant Breeding
- Biofertilizers Technology
- Marine Botany
ELECTIVE COURSE - I
HERBAL TECHNOLOGY

Unit I

Historical background, Present status, Scope of Medicinal Botany – Indigenous medical system – Bioprospecting, Indigenous Knowledge system, Ayurveda, Siddha, Unani, Homeopathy, Tibetan and Folklore system of medicine. Need to Preserve Knowledge system.

Unit II

Distribution of Indian medicinal plants; Introduction, Important medicinal plants, ecodistribution, mapping distribution in different biogeographic zones. Diversity hot spots – Endemism – Rare, endangered and threatened species.

Unit III


Unit IV

Unit V

Conservation of medicinal plants – in-situ and ex-situ conservation. Centers of medicinal plant conservation in India – IBPGRI, CIMAP, CDRI, NBGRI, MSSRF, KFRI, TAMPCOL, TBGRI, TKDL and FRLHT.

References:

- Sushil Kumar – Medicinal Plants in Skin care, CIMAP, Lucknow.
ELECTIVE COURSE - II
FUNGAL BIOTECHNOLOGY

Unit I


Unit II


Unit III

Fungi in Medical Biotechnology – Production of antibiotics and other medically useful products – Antitumour and antiviral agents from fungi — Immunoregulators – Ergot alkaloids – Fungal transformations of Steroids – Biotransformations - Medical applications of fungal enzymes – Medicinal value of higher fungi.

Unit IV

Biosynthesis of Terpenyl Esters – Generation of Aromatic flavour compounds – Bioprocees technology - Novel Industrial Uses for Fungi – Fungi as Agents of Biodeterioration and Biodegradation.

Unit V

Fungi in Food industry – Fungi in Agricultural Biotechnology – Biotechnology and the control of Pathogenic fungi – Recent application in Fungal Biotechnology.
References:

Unit - I


Unit – II

Pure culture – preparation of medium (PDA and Oatmeal Agar medium) Sterilization – preparation of test tube slants- mother spawn in saline bottle – cultivation of white button mushroom (*Agaricus bisporus*).

Unit - III

Cultivation of paddy straw mushroom (*Volvariella volvacea*) and oyster mushroom (*Pleurotus spp.*) with details of bed and spawn preparation, cultivation and harvest. Low cost mushroom farm design of production

Unit – IV


Unit – V

Insects and pest attacking mushroom – fungal, bacterial, viral diseases. Food preparation from mushroom; soup, cutlet, omelette, somasa, pickles, curry. Cost benefit ration – marketing in India and abroad, export value.
Text Books

- Handbook of cultivation, Processing and packing, published by Engineers India Research Institute, 4449, Nai Sarah, Main Road, Delhi 110006.

Reference

ELECTIVE COURSE - IV

CYTOGENETICS AND PLANT BREEDING

Unit - I

Unit II
Structural variations in chromosomes, their cytological consequences, Gene mapping and other uses, Structural hybrids, B-chromosome its origin and consequences. Numerical variation in chromosomes, sources and consequences, euploidy and aneuploidy, classification, natural and induced polyploids.

Unit III
Cytogenetics of Wheat, Cotton, Tobacco, Triticale (Karyotyping). Incompatibility and Male sterility, their types, mechanisms and applications in plant breeding.

Unit IV

Unit – V
Concepts, classification of mutation, physical and chemical mutagens, their mechanism of action, molecular basis of gene mutations, Role of mutations in Plant Breeding.
Text books


References

- Karp G. 1999 Cell and Molecular Biology : Concepts and Experiments, John Wiley and Sons Inc USA.
ELECTIVE COURSE - V

BIOFERTILIZERS TECHNOLOGY

Unit I


Unit II

Application and Evaluation techniques of crop response to biofertilizers – Simplified anaerobic digester for Biofertilizers – Modified anaerobic Fermenter for Biofertilizer – Operation condition for anaerobic digestion of Biofertilizers.

Unit III

Soil fertility and fertilizers – Soil Microbiology and Biofertilizers - Biogas production from organic biofertilizers – Biogas from liquid biofertilizers derived from Banana and Coffee processing

Unit IV


Unit V

References:

- The complete technology book on Vermiculture and vermicompost. NIIR, New Delhi.
ELECTIVE COURSE - VI

MARINE BOTANY

Paper Code 14PBOTE06

<table>
<thead>
<tr>
<th>Credits</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marks</td>
<td>25+75=100</td>
</tr>
<tr>
<td>Hours</td>
<td>4/Week</td>
</tr>
</tbody>
</table>

Unit I


Unit II


Unit III


Unit IV

Seaweed Polysaccharides – Commercial and economical products of Seaweed (Agar, Algin and Carrageenan) and Low molecular weight compounds in algae – Methods of collection and preservation of Marine algae – Commercial cultivation of seaweeds (Traditional and Recent methods) – Application and uses of Seaweeds - Economic importance of seaweeds.
Unit V

Seaweed, Seagrasses, Mangroves and Coral reefs research in India and World. Marine Pollution – human Impact - Conservation strategies of Marine vegetation - Use of Remote sensing techniques in mapping of marine vegetation with GIS.

References:

- Swaminathan, M.S. 2003. Bioresources status in Selected Coastal Location. DBT.
Supportive Course to other Departments

- Bioremediation and Phytoremediation
- Marine Natural Resources
- Forest Ecology and Conservation
- Horticulture and Gardening
SUPPORTIVE COURSE - I

BIOREMEDIATION AND PHYTOREMEDIATION

Unit I


Unit II


Unit III


Unit IV

Sources of heavy metal pollution – microbial interaction with inorganic pollutants – microbial metal resistance – microbial transformation – accumulation and concentration of metals – Biosorption – Biotechnology and heavy metal pollution – Oil field microbiology – Hydrocarbon degradation.
Unit V


References:

SUPPORTIVE COURSE – II

MARINE NATURAL RESOURCES

Unit I


Unit II


Unit III


Unit IV

Biosynthesis of Bioactive metabolites of marine organisms – Introduction – problems of biosynthesis studies – Biosynthesis of metabolites of algae, BGA and macro algae.

Unit V


References:

Unit - I

Forest ecosystem- Forest as an ecosystem, distribution of forests, types of forest, economics and ecology of forest. History of Silviculture, major tropical forest formations- vegetation dynamics- species richness of tropical forest- covers types.

Unit - II

Forest soils – distinguishing features - soils and vegetation development, physical and chemical properties- Types and properties of soils under different forest ecosystems.

Unit – III

Morphology of trees- flowering and seed production- cambial development, crown and root system development. Stand development - height, diameter, basal area and volume growth of even aged and uneven aged stands - stand physiognomy and canopy architecture of tropical trees. Forest influences - radiation, temperature, precipitation patterns, and wind.

Unit – IV

Holistic and Sustainable approach of eco-system management and conservation of biological diversity and its significance.

Unit – V

Role of forests in protection of species regulation of climate and production of various produce. Depletion of biodiversity from forest and the world forest conservation policies. Biological control of insect pests and diseases of forest trees. Molecular tools for developing disease resistance trees.
Text and Reference Books

- P-296
SUPPORTIVE COURSE - IV

HORTICULTURE AND GARDENING

Unit – I


Unit – II

Fruit crops – Induction of flowering, flower thinning fruit setting, fruit developments – cultivation of important fruit crops – Mango, lime, and Guava – Veritable crops: classification, cultivation of important vegetable crops: Tomato, Brinjal and Dolichos lablab.

Unit – III


Unit – IV

Principles and methods of designing a flower garden badges, sedges, fence, tress, climbers – rookeries, terrace garden lawn making and maintenance, water garden – cultivation of water plants

Unit – V


Text book


References

- Kumar. N. (1986). Introduction to horticulture. Rajalakshmi publication