

**DEPARTMENT OF BOTANY**  
**NALLAMUTHU GOUNDER MAHALINGAM COLLEGE**  
**(AUTONOMOUS)**  
**POLLACHI – 642 001**

**SYLLABUS**  
**CBCS & OUTCOME BASED EDUCATION**

**For the students admitted during 2018 - 2021**

**B.Sc., BOTANY**  
**&**  
**ALLIED ZOOLOGY**

**REVISED ON THE BOARD OF STUDIES**

**HELD ON FEBRUARY 2018**

## **NGM COLLEGE**

### **Vision**

Our dream is to make the college an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society

### **Mission**

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instill research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

## **DEPARTMENT OF BOTANY**

### **Vision**

The Department of Botany aims to achieve high quality education and research relevant to local, regional and national needs and through knowledge sharing with leading researchers and educators across the country. We foster an exciting and intellectually stimulating atmosphere for all in a co-operative and positive environment.

### **Mission**

To bring confidence in the lifestyle of any Botany student whose stay will ensure proficiency and competency in the subjects thought. We inculcate the habit of excellence in all the learning activities so as to ensure employability.

## **PROGRAMME OBJECTIVES**

1. To impart quality education to meet the demands of higher education and Research in Botany
2. To develop a competitive edge among the students to meet out their employability

## **PROGRAMME SPECIFIC OUTCOMES**

- PSO1 To appreciate and understand the diversity of cellular forms, lower plants to higher plants
- PSO2 To introduce the theoretical knowledge and basic concepts on Biomolecules, Microbes, Plant Structure, Function and Evolution
- PSO3 To get hands-on training and practical knowledge in the preparation of microsections, herbarium, quantifying biomolecules and other basic techniques
- PSO4 To create interest in identification of plants using Floral characters, genetic traits and Molecular markers
- PSO5 To update the students with modern trends in Plant biology and introduce the interdisciplinary approach

**NALLAMUTHU GOUNDER MAHALINGAM COLLEGE, POLLACHI.**

**DEPARTMENT OF BOTANY**

**B.Sc., BOTANY**

**SCHEME OF EXAMINATION (I - VI SEMESTER)**

**(FOR CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2018-2021 BATCH)**

*(CBCS for under graduate programmes with language for 4 semesters)*

| Part No            | Course Code | Course title  | Lecture+ Tutorial/ Practical Hours/ week | Duration of Exam Hrs | Max. Marks |                 |       | Credit Point |
|--------------------|-------------|---|--|----------------------|------------|-----------------|-------|--------------|
|                    |             |   |  |                      | Internal   | End-of-Semester | Total |              |
| <b>Semester I</b>  |             |   |  |                      |            |                 |       |              |
| <b>I</b>           | 18UTL101    | Tamil/Hindi Paper – I   | 6  | 3                    | 25         | 75              | 100   | 3            |
| <b>II</b>          | 18UEN101    | English Paper – I   | 5  | 3                    | 25         | 75              | 100   | 3            |
| <b>III</b>         | 18UBY101    | Major Paper I - Plant Diversity I (Phycology, Mycology and Bryology)  | 9  | 3                    | 25         | 75              | 100   | 4            |
|                    | 18UZY1A1    | Allied - Paper I Zoology  | 7  | 3                    | 25         | 75              | 100   | 3            |
| <b>IV</b>          | 18UHR101    | Human Rights  | 1  | 2                    | -          | 50              | 50    | 2            |
|                    | 18HEC101    | Human Excellence - Personal values & SKY yoga practice- I   | 2  | 2                    | 25         | 25              | 50    | 1            |
| <b>V</b>           |             | Extension Activities (NSS, NCC, Sports & Games)   |  |                      |            |                 |       |              |
| <b>500</b>         |             |   |  |                      |            |                 |       | <b>16</b>    |
| <b>Semester II</b> |             |   |  |                      |            |                 |       |              |
| <b>I</b>           | 18UTL202    | Tamil/ Hindi Paper – II   | 6  | 3                    | 25         | 75              | 100   | 3            |
| <b>II</b>          | 18UEN202    | English Paper – II  | 5  | 3                    | 25         | 75              | 100   | 3            |
| <b>III</b>         | 18UBY202    | Major Paper II Plant Diversity II (Pteridophytes Gymnosperms and Palaeobotany)  | 6  | 3                    | 25         | 75              | 100   | 4            |
|                    | 18UBY203    | Major Practical I – Paper III (Plant diversity I & II (Phycology, Mycology and Bryology & Pteridophytes Gymnosperms and Palaeobotany) | 2  | 3                    | 40         | 60              | 100   | 4            |
|                    | 18UZY2A2    | Allied - Paper II Zoology   | 7  | 3                    | 25         | 75              | 100   | 3            |
|                    | 18UZY2A3    | Allied - Paper III Practical  | 2  | 3                    | 40         | 60              | 100   | 4            |
| <b>IV</b>          | 18EVS201    | Environmental Studies   | 2  | 2                    | -          | 50              | 50    | 2            |
|                    | 18HEC202    | Human Excellence - Family values & SKY yoga practice- II  | 2  | 2                    | 25         | 25              | 50    | 1            |
| <b>V</b>           |             | Extension Activities (NSS, NCC, Sports & Games)   |  |                      |            |                 |       |              |

|                     |                                    |  |   |   |    |    |     | <b>700</b> | <b>24</b> |  |
|---------------------|------------------------------------|--|---|---|----|----|-----|------------|-----------|--|
| <b>Semester III</b> |                                    |  |   |   |    |    |     |            |           |  |
| <b>I</b>            | 18UTL303                           | Tamil/ Hindi Paper – III   | 5 | 3 | 25 | 75 | 100 | 3          |           |  |
| <b>II</b>           | 18UEN303                           | English Paper – III  | 6 | 3 | 25 | 75 | 100 | 3          |           |  |
| <b>III</b>          | 18UBY304                           | Major Paper IV-<br>Anatomy and<br>Embryology   | 9 | 3 | 25 | 75 | 100 | 4          |           |  |
|                     | 18UCY3A4                           | Allied Paper IV -<br>Chemistry   | 8 | 3 | 25 | 75 | 100 | 3          |           |  |
| <b>IV</b>           | 18UBY3N1/<br>18UBY3N2              | Skill based subjects (Non<br>major electives)-<br>Landscape designing/<br>Herbal cosmetics<br>*Basic Tamil paper I                                   | 1 | 2 | -  | 50 | 50  | 2          |           |  |
|                     | 18HEC303                           | Human Excellence -<br>Professional values &<br>SKY yoga practice- III  | 2 | 2 | 25 | 25 | 50  | 1          |           |  |
| <b>V</b>            |                                    | Extension Activities<br>(NSS, NCC, Sports &<br>Games)  |   |   |    |    |     |            |           |  |
|                     |                                    |  |   |   |    |    |     | <b>500</b> | <b>16</b> |  |
| <b>Semester IV</b>  |                                    |  |   |   |    |    |     |            |           |  |
| <b>I</b>            | 18UTL404                           | Tamil/ Hindi Paper – IV  | 5 | 3 | 25 | 75 | 100 | 3          |           |  |
| <b>II</b>           | 18UEN404                           | English Paper – IV   | 6 | 3 | 25 | 75 | 100 | 3          |           |  |
| <b>III</b>          | 18UBY405                           | Major Paper V –<br>Cytology, Biochemistry<br>and Biophysics  | 6 | 3 | 25 | 75 | 100 | 4          |           |  |
|                     | 18UBY406                           | Major Practical II -<br>Paper VI (Anatomy &<br>Embryology, Cytology,<br>Biochemistry and<br>Biophysics)  | 2 | 3 | 40 | 60 | 100 | 4          |           |  |
|                     | 18UCY3A5                           | Allied - Paper V-<br>Chemistry   | 6 | 3 | 25 | 75 | 100 | 3          |           |  |
|                     | 18UCY3A6                           | Allied paper VI –<br>Chemistry Practical   | 2 | 3 | 40 | 60 | 100 | 4          |           |  |
| <b>IV</b>           | 18UBY4N3/<br>18UBY4N4              | Skill based subjects (Non<br>major electives)-<br>(Remote sensing and<br>natural resource<br>management/<br>Bioinformatics)<br>*Basic Tamil paper II | 1 | 2 | -  | 50 | 50  | 2          |           |  |
|                     | 18HEC404                           | Human Excellence –<br>Social values & SKY<br>yoga practice- IV   | 2 | 2 | 25 | 25 | 50  | 1          |           |  |
| <b>V</b>            | 18UNC401/<br>18UNS402/<br>18USG403 | NCC/<br>NSS /<br>Sports and Games  |   |   |    | 50 |     | 50         | 1         |  |
|                     |                                    |  |   |   |    |    |     | <b>750</b> | <b>25</b> |  |

| Semester V    |                       |  |    |   |    |    |             |            |
|---------------|-----------------------|--|----|---|----|----|-------------|------------|
| <b>III</b>    | 18UBY507              | Major Paper – VII - Taxonomy of Angiosperms  | 6  | 3 | 25 | 75 | 100         | 4          |
|               | 18UBY508              | Major Paper VIII - Genetics and evolution  | 5  | 3 | 25 | 75 | 100         | 4          |
|               | 18UBY509              | Major Paper IX – Microbiology and plant pathology                                    | 5  | 3 | 25 | 75 | 100         | 4          |
|               | 18UBY510              | Major Paper X – Genetic Engineering  | 5  | 3 | 25 | 75 | 100         | 4          |
|               | 18UBY511              | Elective -I Mathematics for Biologists   | 5  | 3 | 25 | 75 | 100         | 5          |
| <b>IV</b>     | 18UBY5S1/<br>18UBY5S2 | Skill based subjects (Major electives)- Microscopic techniques/ Mushroom cultivation | 1  | 2 | -  | 50 | 50          | 2          |
|               | 18GKL501              | General Knowledge & General Awareness (SBE)  | SS | 2 | -  | 50 | 50          | 2          |
|               | 18HEC505              | Human Excellence - National values & SKY yoga practice- V                            | 2  | 2 | 25 | 25 | 50          | 1          |
|               |                       |  |    |   |    |    | <b>650</b>  | <b>26</b>  |
| Semester VI   |                       |  |    |   |    |    |             |            |
| <b>III</b>    | 18UBY612              | Major Paper XII – Plant Physiology   | 6  | 3 | 25 | 75 | 100         | 4          |
|               | 18UBY613              | Major Paper XIII – Economic & Ethnic Botany  | 5  | 3 | 25 | 75 | 100         | 4          |
|               | 18UBY614              | Major Paper XIV - Plant Biotechnology  | 5  | 3 | 25 | 75 | 100         | 4          |
|               | 18UBY615              | Elective II – Bioinformatics&Cyber security  | 5  | 3 | 25 | 75 | 100         | 5          |
|               | 18UBY616              | Elective – III – Habitat Ecology   | 5  | 3 | 25 | 75 | 100         | 5          |
|               | 18UBY617              | Major Practical III – Paper XV (for V Sem theory papers)                             | 2  | 3 | 40 | 60 | 100         | 4          |
|               | 18UBY618              | Major Practical IV (for VI Sem theory papers)  | 2  | 3 | 40 | 60 | 100         | 4          |
| <b>IV</b>     | 18UBY6S3<br>18UBY6S4  | Skill based subjects (Major electives)- Horticulture & Plant breeding/ Biofarming    | 1  | 2 | -  | 50 | 50          | 2          |
|               | 18HEC606              | Human Excellence - Global values & SKY yoga practice- VI                             | 2  |   | 25 | 25 | 50          | 1          |
|               |                       |  |    |   |    |    | <b>800</b>  | <b>33</b>  |
| **Grand total |                       |  |    |   |    |    | <b>3900</b> | <b>140</b> |

\* The credits given are applicable only to the students who opt for Basic Tamil paper and the credits for Human Excellence papers cannot be given to them.

\*\*Grand total should be equal/below 3900 (For UG Programmes); 2550 (For PG Programmes)

SS – Self study, SBE – Skill Based Elective, NME–Non Major Elective

**Bloom's Taxonomy Based Assessment Plan**  
**PART I, II& III**

|                                 |                        | <b>Internal : 25</b> |             |  | <b>External : 75</b> |  |
|---------------------------------|------------------------|----------------------|-------------|--|----------------------|--|
| <b>Bloom's Taxonomy Section</b> | <b>Knowledge Level</b> | <b>Section</b>       | <b>Mark</b> | <b>Description</b>   | <b>Total</b>         |  |
| K                               | K1                     | 1-5<br>Section-A     | 5x1         | MCQ(One question from each unit)   | 5                    |  |
|                                 | K1                     | 6-10<br>Section-A    | 5x1         | Short answers (One question from each unit)  | 5                    |  |
| U                               | K2                     | 11-15<br>Section-B   | 5x5         | Short answers<br>Either/ Or type (One question from each unit)                       | 25                   |  |
| A                               | K3                     | 16-21<br>Section-C   | 4x10        | Detailed Four out of six<br>(Question no.16 is compulsory)<br>17-21 Answer any three | 40                   |  |
| <b>Total</b>                    |                        |                      |             |  | <b>75</b>            |  |

| <b>Bloom's Taxonomy Section</b> | <b>Knowledge level</b> | <b>Section</b> | <b>Pattern</b>                                   | <b>External : 50</b> |           |
|---------------------------------|------------------------|----------------|--|----------------------|-----------|
|                                 |                        |                |  | Marks                | Total     |
| K                               | K1                     | Part A         | 1-5 Multiple choice with 4 options               | 5x1                  | 5         |
| U                               | K2                     |                | 6-10 Short answers (One question from each unit) | 5x1                  | 5         |
| A                               | K3                     | Part B         | Open choice (5 out of 8 Questions)               | 5x8                  | 40        |
| <b>Total :</b>                  |                        |                |  |                      | <b>50</b> |

- Communicative English and General Awareness papers include 60% objective type of questions and 40% descriptive type of questions
- GK 100% objective type of questions (online exam)
- The marks and credits for Extension activities are given by the corresponding Departments



## SYLLABUS

|                       |                 |   |                                     |
|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                                      | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY101</b> | <b>Course Title</b>   | <b>2018-2021</b>                    |
|                       |                 | <b>PLANT DIVERSITY I (PHYCOLOGY, MYCOLOGY AND BRYOLOGY)</b> | <b>Semester 1</b>                   |
| <b>Hrs/Week: 5</b>    |                 |   | <b>Credits 4</b>                    |

### Course Objective

- To understand the morphology, structure, life cycle of the selected forms of Algae, Fungi, Lichens and Bryophyte.
- To appreciate the diversity of lower plants

### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To differentiate lower plants like Algae, Fungi, Lichens and Bryophytes               |
| K2 | CO2 | To understand the morphology and lifecycle of Algae, Fungi, Lichens, Bryophyte        |
| K3 | CO3 | To apply different classification systems to appreciate the diversity of lower plants |
| K4 | CO4 | To identify the economically important Algae, Fungi, Lichens and Bryophytes           |

| <b>Unit</b>     | <b>Content</b>   | <b>Hrs</b> |
|-----------------|--|------------|
| <b>Unit I</b>   | General characters of algae - Classification of algae (Fritsch) – Distribution, structure, reproduction and life cycle of the following: Cyanophyceae ( <i>Oscillatoria</i> ), Chlorophyceae ( <i>Oedogonium</i> , <i>Chara</i> ) and Phaeophyceae ( <i>Sargassum</i> ). | <b>13</b>  |
| <b>Unit II</b>  | Distribution, structure, reproduction and life cycle of the following: Rhodophyceae ( <i>Polysiphonia</i> ) and Bacillariophyceae ( <i>Cyclotella</i> & <i>Pinnularia</i> ) - <b>*Economic importance of algae.</b>  | <b>13</b>  |
| <b>Unit III</b> | General characters of Fungi - Mode of nutrition - Classification of Fungi (Alexopoulos, 1972) - <b>*Economic Importance of Fungi</b> - Structure, reproduction and life cycle of Zygomycetes- <i>Mucor</i> , Ascomycetes – <i>Penicillium</i> , Yeasts                   | <b>13</b>  |
| <b>Unit IV</b>  | Structure, reproduction and life cycle of Basidiomycetes - <i>Puccinia</i> . Lichens: Occurrence, Morphology, structure, Reproduction and Economic importance.   | <b>13</b>  |
| <b>Unit V</b>   | General characters and classification of Bryophytes (Reimers), Distribution, structure, development and reproduction of <i>Riccia</i> , <i>Anthoceros</i> and <i>Polytrichum</i> .   | <b>13</b>  |

*\*Self study topics*

|   |
|---|
| Power point Presentations, Seminar ,Quiz, Assignment, |
|---|

**Text Books:**

1. Smith, G.M., 1971. Cryptogamic Botany Vol. I Algae & Fungi. Tata McGraw Hill Publishing Co., New Delhi.
2. Smith, G.M., 1971. Cryptogamic Botany Vol. II Bryophytes & Pteridophytes. Tata McGraw Hill Publishing Co., New Delhi.
3. Sharma O.P. 1992. Text book of Thalophytes. McGraw Hill Publishing Co., New Delhi.

**Reference Books:**

4. Sharma P. D. 1991. The Fungi, Rastogi & Co., Meerut
5. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3<sup>rd</sup>Edn. College Botany Vol. I & II, New central book agency, Calcutta.
6. Dube H. C. 1990. An introduction to Fungi. Vikas Publishing House Pvt. Ltd., Delhi.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | H    | H    | M    | H    | H    |
| CO2      | H    | H    | M    | H    | H    |
| CO3      | H    | H    | M    | H    | L    |
| CO4      | H    | H    | M    | H    | L    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. A. Logamadevi                  | Dr.R.Kannan                            | Dr.M.Durairaju |     |

|                                       |  |                        |                                     |
|---------------------------------------|--|------------------------|-------------------------------------|
| <b>Programme Code</b>                 | <b>B.Sc.,</b>  | <b>Programme Title</b> | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b><br><b>18UZY1A1</b> | <b>Course Title</b>  |                        | <b>2018-2021</b>                    |
|                                       | <b>ANCILLARY BOTANY PAPER - I (PLANT DIVERSITY, ANATOMY, EMBRYOLOGY AND PLANT PATHOLOGY)</b> |                        | <b>Semester 1</b>                   |
| <b>Hrs/Week</b>                       | <b>6</b>   |                        | <b>Credits 3</b>                    |

#### Course Objective

- To appreciate the diversity in lower plants
- To understand the anatomy of angiosperms
- To know the embryo development and fertilization in higher plants
- To teach important plant diseases, causal organisms and control.

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To recollect the existing diversity among lower plants                          |
| K2 | CO2 | To understand the internal structure and embryology of angiosperms              |
| K3 | CO3 | To analyze the economically important plant diseases and their control measures |
| K4 | CO4 | To obtain the skill of technically draw the plant tissues                       |

| <b>Unit</b>     | <b>Content</b>   | <b>Hrs</b> |
|-----------------|--|------------|
| <b>Unit I</b>   | Structure, life history and <b>*economic importance</b> of the following types: Algae: <i>Chlorella</i> , Diatoms and <i>Polysiphonia</i> , Fungi: <i>Penicillium</i> and <i>Agaricus</i> , Lichens.                   | <b>16</b>  |
| <b>Unit II</b>  | A brief account of the structure, reproduction and life cycle of the following genera (excluding development of sex organs): Bryophyte: <i>Riccia</i> , Pteridophyte: <i>Lycopodium</i> and Gymnosperm: <i>Cycas</i> . | <b>16</b>  |
| <b>Unit III</b> | Simple tissues – parenchyma, collenchyma and sclerenchyma - complex tissues – xylem and phloem - cambium – primary structure and secondary structure of dicot stem.  | <b>15</b>  |
| <b>Unit IV</b>  | Anther structure – ovule structure – 8-nucleate embryo sac – double fertilization – endosperm (nuclear and cellular) – structure of dicot and monocot embryos (development excluded) – polyembryony - parthenocarpy.   | <b>15</b>  |
| <b>Unit V</b>   | Study of plant diseases - viral disease (TMV) - bacterial disease (citrus canker) - fungal disease (red rot of sugarcane) – <b>*Plant disease control</b> – physical, chemical and biological methods.                 | <b>15</b>  |

*\*Self study topics*

|   |
|---|
| Power point Presentations, Seminar ,Quiz, Assignment, |
|---|

**Text Books:**

1. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3<sup>rd</sup>Edn. College Botany Vol. I & II, New central book agency, Calcutta.
2. Susil Kumar Mukerjee, 1984. College botany, Vol.III. New Central Book agency, Calcutta.
3. Jain, V.K., 1974. Fundamentals of plant physiology, 6<sup>th</sup>Edn., S. Chand & Company Ltd., New Delhi.

**Reference Books:**

4. George, H.M., Lawrence, 1958. Taxonomy of vascular plants. The Macmillan Company, Newyork.
5. Pandey, B.P. 1997. Economic botany, C. Chand & Company Ltd., New Delhi.
6. Salisbury, F.B. and Rose, 1986. Plant physiology, 3<sup>rd</sup>Edn, C.B.S. Publishers, New Delhi.
7. Kumar, N., Abdul Khader, JBM., M.D. Rangaswami, P. and I.Irullappan, 1993. Introduction to species, Plantations crops, Medicinal and aromatic plants, Rajalakshmi publication, Nagercoil, Tamilnadu, India.
8. Wallils, T.E.,1985. Text book of pharmacognosy, 5<sup>th</sup>Edn. CBS publishers & distributors, Delhi.
9. Kumaresan, V., 1998. Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.
10. Ignacimuthu, S.,1996. Applied Biotechnology. Tata McGraw Hill Publishing Company Ltd., New Delhi.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | H    | S    | H    | H    | L    |
| CO2      | H    | S    | H    | H    | M    |
| CO3      | H    | S    | M    | H    | M    |
| CO4      | H    | S    | H    | H    | M    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC              | COE |
|------------------------------------|--|------------------|-----|
| Dr. M. Latha Isabel                | Dr. R. Kannan                          | Dr. M. Durairaju |     |
|                                    |  |                  |     |
|                                    |  |                  |     |

|                       |                 |   |                                     |
|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY101</b> | <b>Course Title</b>   | <b>2018-2021</b>                    |
|                       |                 | <b>PLANT DIVERSITY II (PTERIDOPHYTES, GYMNOSPREMS AND PALAEOBOTANY)</b> | <b>Semester 2</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |   | <b>Credits 4</b>                    |

### Course Objective

- To study the morphology, life cycle and economic value of selected Pteridophytes, Gymnosperms
- To learn the concept of evolution and paleobotany

### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To appreciate the morphology and lifecycle of Algae, Fungi, Lichens, Bryophyte    |
| K2 | CO2 | To understand the concepts of evolution, Paleobotany and evolution of land plants |
| K3 | CO3 | To identify the economically important Pteridophytes and Gymnosperms              |
| K4 | CO4 | To analyse the fossil slides and specimen   |

| <b>Unit</b>     | <b>Content</b>  | <b>Hrs</b> |
|-----------------|---|------------|
| <b>Unit I</b>   | General characters and classification of Pteridophytes (Reimers) - stelar evolution - heterospory and origin of seed habit - structure and reproduction of <i>Gleichenia</i> and Lycopsida( <i>Lycopodium</i> )   | <b>13</b>  |
| <b>Unit II</b>  | Structure and reproduction of Sphenopsida ( <i>Equisetum</i> ) and Pteropsida ( <i>Marsilea</i> ). <b>*Economic importance of Pteridophytes.</b>  | <b>13</b>  |
| <b>Unit III</b> | General characters and classification of Gymnosperms (Sporne, 1965) - structure development and reproduction of <i>Cycas</i> .  | <b>13</b>  |
| <b>Unit IV</b>  | Structure development and reproduction of <i>Gnetum</i> – affinities of <i>Gnetum</i> with Angiosperms <b>*Economic importance of Gymnosperms.</b>  | <b>13</b>  |
| <b>Unit V</b>   | Palaeobotany - Geological time scale – fossils - fossilisation - kinds of fossils - detailed study of <i>Rhynia</i> , <i>Lepidodendron</i> , <i>Lepidocarpon</i> , <i>Lepidostrobus</i> and <i>Williamsonia</i> . | <b>13</b>  |

*\*Self study topics*

|   |
|---|
| Power point Presentations, Seminar ,Quiz, Assignment, |
|---|

**Text Books:**

1. Smith, G.M., 1971. Cryptogamic Botany Vol. II Bryophytes & Pteridophytes. Tata McGraw Hill Publishing Co., New Delhi.
2. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3<sup>rd</sup> Edn. College Botany Vol. II, New central book agency, Calcutta.
3. Sporne K.R. 1991. The morphology of Gymnosperms. B.I. Publications Pvt. Bombay Calcutta, Delhi.

**Reference Books:**

4. Sharma O.P. 1992. Text book of Pteridophyta, Macmillan India Ltd., New Delhi.
5. Wilson, N.S. and Rothwell, G.W. 1993. Palaeobotany and the evolution of plants (2<sup>nd</sup> edition), Cambridge University Press, UK.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | S    | H    | M    | M    | H    |
| CO2      | S    | H    | M    | M    | L    |
| CO3      | S    | H    | H    | M    | H    |
| CO4      | S    | S    | L    | M    | L    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr.M.Latha Isabel                  | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |

|                       |                 |   |                                     |
|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                                  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY203</b> | <b>Course Title</b>                                     | <b>2018-2021</b>                    |
|                       |                 | <b>MAJOR PRACTICAL - I (PLANT DIVERSITY I &amp; II)</b> | <b>Semester 2</b>                   |
| <b>Hrs/Week</b>       | <b>2</b>        |   | <b>Credits 4</b>                    |

### Course Objective

- To get hands on knowledge on microbial culture techniques
- To understand the plant diversity, thallus construction of selected forms
- To learn about the fossilized plant forms and Plant evolution.

### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To revise the morphology and reproductive structures in Algae, Fungi, Lichens, and Bryophyte                |
| K2 | CO2 | To get the picture of internal structures and spore bearing parts of selected plant forms                   |
| K3 | CO3 | To compare the life cycles of Algae, Fungi, Lichens, Bryophytes, Pteridophytes and Gymnosperms              |
| K4 | CO4 | To prepare micro sections and to professionally draw plant sketches, to identify fossil specimen and slides |

| <b>Unit</b>     | <b>Content</b>  | <b>Hrs</b> |
|-----------------|---|------------|
| <b>Unit I</b>   | A detailed study of thallus organization and reproductive structures of the following forms:<br><b>Algae</b> – <i>Oscillatoria</i> , <i>Oedogonium</i> , <i>Chara</i> , <i>Sargassum</i> , <i>Polysiphonia</i> , <i>Cyclotella</i> and <i>Pinnularia</i> . <b>Fungi</b> - <i>Mucor</i> , <i>Penicillium</i> , Yeasts and <i>Puccinia</i> . <b>Lichen</b> – <i>Usnea</i> . | <b>5</b>   |
| <b>Unit II</b>  | A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera:<br><b>Bryophytes</b> - <i>Riccia</i> , <i>Anthoceros</i> and <i>Polytrichum</i> .  | <b>5</b>   |
| <b>Unit III</b> | A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera:<br>Pteridophytes - <i>Lycopodium</i> , <i>Gleichenia</i> and <i>Marsilea</i> .   | <b>5</b>   |
| <b>Unit IV</b>  | A detailed study of morphology, anatomy and structure of vegetative & spore bearing parts of the following genera:<br>Gymnosperms - <i>Cycas</i> and <i>Gnetum</i> .  | <b>6</b>   |
| <b>Unit V</b>   | A detailed study of the following fossil genera<br><i>Rhynia</i> , <i>Lepidodendron</i> , <i>Lepidocarpon</i> , <i>Lepidostrobis</i> and <i>Williamsonia</i> from fossil specimen/parts or slides.  | <b>6</b>   |

Preparing micro sections and mounting, Spotters, Specimen, Slides.

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | S    | M    | S    | H    | L    |
| <b>CO2</b> | S    | M    | S    | H    | H    |
| <b>CO3</b> | S    | M    | S    | H    | L    |
| <b>CO4</b> | S    | M    | S    | H    | M    |

S-Strong; H-High; M-Medium; L-Low

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr. M. Latha Isabel                        | Dr.R.Kannan                                    | Dr.M.Durairaju |            |
| Dr.K.Rajalakshmi                           |  |                |            |
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|                       |                 |  |                                     |
|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>   | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UZY2A2</b> | <b>Course Title</b>  | <b>2018-2021</b>                    |
|                       |                 | <b>ANCILLARY BOTANY PAPER - II (TAXONOMY OF ANGIOSPERMS, PHYSIOLOGY, HORTICULTURE, MEDICINAL BOTANY &amp; PLANT BIOTECHNOLOGY)</b> | <b>Semester 2</b>                   |
| <b>Hrs/Week</b>       | <b>6</b>        |  | <b>Credits 3</b>                    |

### Course Objective

- To appreciate the diversity in flowering plants
- To understand the physiology of angiosperms
- To learn the available horticultural techniques to raise new plantlets
- To study the selected medicinal plants and popular drugs from them
- To understand the basics of plant biotechnology

### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To appreciate the morphology and lifecycle of selected Angiosperms                               |
| K2 | CO2 | To understand the concepts of Plant functions, Plant propagation, Plant tissue culture           |
| K3 | CO3 | To identify flowering plants and medicinal plants in their habit.                                |
| K4 | CO4 | To know-how different cutting, layering, grafting, budding methods to propagate different plants |

| <b>Unit</b>     | <b>Content</b>   | <b>Hrs</b> |
|-----------------|--|------------|
| <b>Unit I</b>   | Plant Morphology (Terms only) - Vegetative and floral characters and Economic importance of the following families: Annonaceae, Rutaceae, Rubiaceae, Acanthaceae, Amarantaceae, Euphorbiaceae and Liliaceae.   | <b>16</b>  |
| <b>Unit II</b>  | Photosynthesis – A brief account of light and dark reactions with reference to C3 plants – respiration – glycolysis, krebs cycle, oxidative phosphorylation – growth regulators – auxins, gibberellic acid and ABA.                                  | <b>16</b>  |
| <b>Unit III</b> | Horticulture: Seed propagation- asexual propagation and its advantages – cutting, layering, grafting and budding – * <b>hydroponics</b> – bonsai.  | <b>15</b>  |
| <b>Unit IV</b>  | Pharmacognosy – definition and history – drugs obtained from algae ( <i>Spirulina</i> ), fungi ( <i>Penicillium</i> ), gymnosperms ( <i>Ginkgo</i> ) and angiosperms ( <i>Rauwolfia serpentina</i> and <i>Phyllanthus amarus</i> ) – nutraceuticals. | <b>15</b>  |
| <b>Unit V</b>   | Plant Biotechnology – plant tissue culture: totipotency – micropropagation – meristem culture – Transgenesis – Genetically modified food (Bt cotton and * <b>Golden rice</b> ).  | <b>15</b>  |

\*Self study topics

**Text Books:**

1. Hirendra Chandra Gangulee, Kumuel Shankar Das Chittatosh Datta, 1968. 3<sup>rd</sup>Edn. College Botany Vol. I & II, New central book agency, Calcutta.
2. Pandey B.P, 1986, Text Book of Botany (College Botany) Vol I and II, S.Chand and co. New Delhi.
3. Narayanaswamy, R.V & Rao, K.N .1976. Outlines of Botany, S. Viswanthan. Printers & Publishers, Madras.
4. Bhojwani, S.S. and Bhatnagar, S.P., 2009. The embryology of angiosperms, Vikas publishing house pvt Ltd., New Delhi.
5. Pandey, B.P., 1987. Plant anatomy, 4<sup>th</sup>Edn., S. Chand & Company, New Delhi.

**Reference Books:**

6. Gilbert, M. Smith, 1972. Cryptogamic botany: Algae and Fungi, Vol I. 2<sup>nd</sup>Edn. Tata McGraw Hill Publishing Ltd., New Delhi.
7. Krishnamoorthy, K.V. and K.N. Rao, 1984. Angiosperms, Viswanathanprinterspvt Ltd., Chennai.
8. Hirendra Chandra Gangulee and Ashok Kumar Kar, 1970. College Botany Vol II. New Central Book Agency, Calcutta.
9. Katherine Esau, 1953. Plant anatomy, 2<sup>nd</sup>Edn, Wiley Eastern pvt. Ltd., New Delhi.
10. Vashishta, P.C., 1997. Botany for degree students – Pteridophytes Part IV, S. Chand & Company Ltd., New Delhi.
11. Reinert J. and Bajaj, Y.P.S., 1988. Applied and Fundamental aspects of Plant cell and tissue organ culture, Narosa Publishing house, New Delhi.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | S    | H    | H    | S    | L    |
| CO2      | M    | S    | M    | M    | M    |
| CO3      | S    | H    | M    | S    | M    |
| CO4      | L    | M    | H    | M    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. M. Latha Isabel                | Dr.R.Kannan                            | Dr.M.Durairaju |     |
| Dr.K.Rajalakshmi                   |  |                |     |
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|-----------------------|-----------------|-----------------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>            | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UZY2A3</b> | <b>Course Title</b>               | <b>2018-2021</b>                    |
|                       |                 | <b>ANCILLARY BOTANY PRACTICAL</b> | <b>Semester 2</b>                   |
| <b>Hrs/Week</b>       | <b>2</b>        |                                   | <b>Credits 4</b>                    |

#### Course Objective

- To know the diversity, morphology, anatomy and reproductive structures of selected lower plants and higher plants.
- To impart the basic plant breeding, horticultural techniques and plant diseases.
- To introduce important medicinal plants and principles of plant biotechnology

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To recollect some selected lower plants and higher plants in their habit            |
| K2 | CO2 | To understand the internal structure, embryology and physiology of angiosperms      |
| K3 | CO3 | To analyze the economically important plant diseases and their control measures     |
| K4 | CO4 | To prepare microsections and obtain the skill of technically draw the plant tissues |
| K5 | CO5 | To propagate plants using simple horticultural techniques                           |

| Unit            | Content   | Hrs      |
|-----------------|---|----------|
| <b>Unit I</b>   | <b>Plant Biodiversity</b><br>Algae- <i>Chlorella</i> , Diatoms and <i>Polysiphonia</i> , Fungi- <i>Penicillium</i> and <i>Agaricus</i> , Lichens - <i>Usnea</i> , Bryophyte - <i>Riccia</i> , Pteridophyte - <i>Lycopodium</i> and Gymnosperm - <i>Cycas</i> , Symptoms and causal organisms and control measures of TMV, citrus canker and red rot of sugarcane. | <b>6</b> |
| <b>Unit II</b>  | <b>Plant Anatomy and Embryology</b><br>Parenchyma, collenchyma, sclerenchyma, xylem and phloem. Primary structure of dicot stem ( <i>Tridax</i> ), secondary structure of dicot stems ( <i>Tridax</i> and <i>Polyalthia</i> ). Permanent slides - structure of anther, ovule, embryo sac and embryo.  | <b>6</b> |
| <b>Unit III</b> | <b>Taxonomy of Angiosperms</b><br>Morphology – Diagrams - A detailed study of the following families: Annonaceae, Rutaceae, Rubiaceae, Acanthaceae, Amarantaceae, Euphorbiaceae and Liliaceae.  | <b>5</b> |
| <b>Unit IV</b>  | <b>Plant Physiology (Demonstration)</b><br>Photosynthesis - test tube and funnel experiment and light screen experiment. Respiration – Ganong’s respiroscope (aerobic) and Kuhn’s fermentation (anaerobic).<br><b>Horticulture:</b> Charts on cutting, layering and grafting.   | <b>5</b> |
| <b>Unit V</b>   | <b>Medicinal Botany &amp; Plant Biotechnology</b><br>Study of following medicinal plants: <i>Spirulina</i> , <i>Penicillium</i> , <i>Ginkgo</i> , <i>Rauwolfia serpentina</i> and <i>Phyllanthus amarus</i> . Plant biotechnology charts.   | <b>5</b> |

Slides, Demonstrations, Simple experiments using apparatus, Power point Presentations,

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | S    | M    | M    | S    | M    |
| <b>CO2</b> | S    | L    | H    | S    | M    |
| <b>CO3</b> | S    | M    | S    | H    | M    |
| <b>CO4</b> | S    | L    | S    | H    | H    |
| <b>CO5</b> | M    | M    | H    | H    | S    |

S-Strong; H-High; M-Medium; L-Low

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr. M. Latha Isabel                        | Dr.R.Kannan                                    | Dr.M.Durairaju |            |
| Dr. K. Rajalakshmi                         |  |                |            |

|                       |                 |                               |                                     |
|-----------------------|-----------------|-------------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>        | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY304</b> | <b>Course Title</b>           | <b>2018 -2021</b>                   |
|                       |                 | <b>ANATOMY AND EMBRYOLOGY</b> | <b>Semester 3</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |                               | <b>Credits 4</b>                    |

### Course Objective

- To acquire knowledge about the entire plant growth and development.
- To know various anatomical features of flowering plants
- To understand the important events in embryo development and fertilization.

### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To revisit the theories on Plant cell, tissues and cell division       |
| K2 | CO2 | To understand the anatomy of various plant parts                       |
| K3 | CO3 | To analyze the internal structure and embryology of angiosperms        |
| K4 | CO4 | To compare the growth and developmental pattern of dicots and monocots |

| Unit            | Content  | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | <b>Anatomy:</b> Plant body – cell types and tissues – meristems - Apical meristem – Shoot and root – theories – Cambium and its functions - permanent tissues - simple and complex – Vascular bundles and its types – differentiation – dedifferentiation – redifferentiation.                   | <b>13</b> |
| <b>Unit II</b>  | Primary structure of stem and root (monocot and dicot) – normal secondary growth in dicot stem and dicot root – anomalous secondary growth in dicot stem ( <i>Boerhaavia</i> ) and monocot stem ( <i>Dracaena</i> ) - dicot root ( <i>Achyranthes</i> ) - wood structure (sap wood & heartwood). | <b>13</b> |
| <b>Unit III</b> | Leaf – epidermal tissues – trichomes – stomatal types – internal structure of monocot (Grass) and dicot ( <i>Tridax</i> ) leaves. Anatomy of hydrophytic leaf ( <i>Hydrilla</i> ) and xerophytic leaf ( <i>Casuarina</i> ). Structural modifications in stems, root and leaves.                  | <b>13</b> |
| <b>Unit IV</b>  | <b>Embryology:</b> Flower – Anther structure - microsporangium - microsporogenesis – structure & development of male gametophyte – ovule – types – megasporangium - megasporogenesis ( <i>Polygonum</i> type) – structure and development of female gametophyte – types of embryo sac.           | <b>13</b> |
| <b>Unit V</b>   | Pollination – double fertilization and triple fusion – endosperm – types – embryo – structure and development - dicot ( <i>Capsella</i> ) and monocot ( <i>Najas</i> ) – polyembryony – formation of seed – fruit – parthenocarpy.   | <b>13</b> |

\*Self study topics

|  |
|--|
| Charts, Powerpoint presentation, Seminar, Quiz, Assignment |
|--|

**Text Books:**

1. Bhojwani S.S. and Bhatnagar, S.P., 2000. The embryology of angiosperms. 4<sup>th</sup> edition, Vikas printing houses, New Delhi.
2. Esau K. 1977. Anatomy of seed plants. 2<sup>nd</sup> edition. John Wiley & Sons, New York.
3. Vashista P.C., 1997. Plant Anatomy, S. Chand & Co., New Delhi.

**Reference Books:**

4. Fahn A., 1974. Plant Anatomy, 2<sup>nd</sup> edition. Pergamon Press, Oxford.
5. Pandey B.P., 1985. Plant Anatomy, S and Chand & Co., New Delhi.
6. Maheswari P., 1971. An introduction to embryology of angiosperms. Tata McGraw Hill Publishing Co., New Delhi.
7. Swamy B.G.L. and Krishnamurthy, K.V., 1980. From flower to fruit: Embryology of Angiosperms, Tata McGraw Hill Publishing Co., New Delhi.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | H    | S    | H    | M    | M    |
| CO2      | H    | S    | H    | M    | L    |
| CO3      | M    | H    | M    | H    | M    |
| CO4      | H    | H    | H    | M    | L    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. M. Latha Isabel                | Dr.R.Kannan                            | Dr.M.Durairaju |     |
| Dr. A. Logamadevi                  |  |                |     |
|                                    |  |                |     |

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|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>   | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY3N1</b> | <b>Course Title</b>  | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (NON MAJOR):<br/>LANDSCAPE<br/>DESIGNING</b> | <b>Semester 3</b>                   |
| <b>Hrs/Week</b>       | <b>1</b>        |  | <b>Credits 2</b>                    |

### Course Objective

- To introduce the scope and essential elements of landscape.
- To learn various garden structures.

### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To revisit the Gardening types and features                                    |
| K2 | CO2 | To understand the Landscape designing principles                               |
| K3 | CO3 | To analyze the uniqueness of indoor garden                                     |
| K4 | CO4 | To create interest in making flower arrangements, kitchen garden and terrarium |

| <b>Unit</b>     | <b>Content</b>   | <b>Hrs</b> |
|-----------------|--|------------|
| <b>Unit I</b>   | Landscape designing – principles and categories of landscaping - Important ornamental plants – habit and types.                        | <b>3</b>   |
| <b>Unit II</b>  | Gardening – indoor garden: hanging baskets and terrarium – layout and importance of Terrace garden – public garden and its components. | <b>3</b>   |
| <b>Unit III</b> | Garden features -Lawn: layout – preparation of land – propagation – irrigation – weeding – pruning.                                    | <b>2</b>   |
| <b>Unit IV</b>  | Glass house: applications and advantages - rockery –Hydroponics – topiary - bonsai.  | <b>2</b>   |
| <b>Unit V</b>   | Flower arrangement - cut flowers- Role of botanical garden- <i>ex situ</i> , <i>in situ</i> conservation.                              | <b>2</b>   |

### Text Books:

1. Kumar N., 1993. An introduction to horticulture, TNAU, Coimbatore.
2. Mani BhusanRao, 1964. Text book of Horticulture. Macmillan India Ltd., Newdelhi.
3. Pratibhatrivedi, 1996. Home Gardening. Indial Council of Agricultural Research, New Delhi.

### Reference Books:

4. George Acquaah, 2004. Horticulture – principles and practices. Prentice Hall of India Pvt Ltd., New Delhi.
5. Edmond, 1988. Fundamentals of Horticulture. MCGH Publications New Delhi.
6. Satya P. 2012. Plant Breeding. Books and allied Pvt Ltd. Kolkatta.

Powerpoint presentation, Discussion, Demonstration

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | S    | S    | S    | S    | S    |
| CO2      | H    | H    | H    | H    | H    |
| CO3      | H    | H    | H    | M    | H    |
| CO4      | S    | H    | S    | H    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. M. Latha Isabel                | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
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| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY3N2</b> | <b>Course Title</b>   | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (NON MAJOR):<br/>HERBAL COSMETICS</b> | <b>Semester 3</b>                   |
| <b>Hr/Week</b>        | <b>1</b>        |   | <b>Credits 2</b>                    |

#### Course Objective

- To understand the role of herbs as a source of natural and safe cosmetics.

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To recollect the medicinal herbs and the need for herbal cosmetics  |
| K2 | CO2 | To comprehend the principles behind herbal cosmetics                |
| K3 | CO3 | To analyze the various personal care remedies using herbs           |
| K4 | CO4 | To expose the students to prepare home recipes with available herbs |

| Unit            | Content   | Hrs      |
|-----------------|---|----------|
| <b>Unit I</b>   | Herbal cosmetics – introduction – principles – definition – history – need – advantages- disadvantages. | <b>3</b> |
| <b>Unit II</b>  | Herbal skin and hair care – face glow - dark circle remover-tools – ingredients – recipes               | <b>3</b> |
| <b>Unit III</b> | SPA – origin and history – ayurvedic spa – aromatherapy – special spa treatments.                       | <b>2</b> |
| <b>Unit IV</b>  | Manicure and pedicure – history – definition – techniques – benefits.                                   | <b>2</b> |
| <b>Unit V</b>   | Herbal home recipes – herbal shampoo - soap - hair colorant – tooth powder.                             | <b>2</b> |

#### Text Books:

- Babu,S.S., 2000. Herbal cosmetics - Pushkal publishers, Mumbai.
- Asharam,2002.Herbal Indian perfumes and cosmetics, Sri Satguru publications, New Delhi, India

Powerpoint presentation and Demonstration

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | S    | H    | H    | H    | H    |
| <b>CO2</b> | H    | S    | H    | L    | H    |
| <b>CO3</b> | H    | H    | H    | L    | H    |
| <b>CO4</b> | S    | H    | S    | S    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. A. Logamadevi                  | Dr.R.Kannan                            | Dr.M.Durairaju |     |
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|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                           | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY405</b> | <b>Course Title</b>                              | <b>2018-2021</b>                    |
|                       |                 | <b>CELL BIOLOGY, BIOCHEMISTRY AND BIOPHYSICS</b> | <b>Semester 4</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |  | <b>Credits 4</b>                    |

### Course Objective

- To know the structure of plant cell, cell organelles and biochemical molecules of life
- To understand the biophysical laws governing universe

### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To recollect the details about Plant cell, organelles, and their functions  |
| K2 | CO2 | To revisit the structure and functions of biomolecules  |
| K3 | CO4 | To understand the biophysical forces and laws of thermodynamics   |
| K4 | CO5 | To know-how the quantification of biomolecules using selected optical techniques and to analyze the biomolecules using simple separation techniques |

| Unit            | Content  | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | Cell biology: <b>*Ultra structure of Plant cell.</b> Structure and functions of cell wall – plasma membrane – chloroplast - mitochondria – endoplasmic reticulum. Structure and functions of ribosomes - dictyosomes - nucleus - nucleolus – chromosomes: giant chromosomes: polytene and lamp brush - mitosis                                 | <b>13</b> |
| <b>Unit II</b>  | <b>Biochemistry:</b> Biomolecules – structure and functions of carbohydrates ( <b>*monosaccharides</b> and polysaccharides), structure, function and synthesis of proteins and lipids.   | <b>13</b> |
| <b>Unit III</b> | Structure and function of nucleic acids (DNA and RNA) – DNA Replication - enzymes - nomenclature and properties – classification – mechanism of enzyme action (DNA Polymerase) and functions of enzymes.   | <b>13</b> |
| <b>Unit IV</b>  | <b>Biophysics:</b> Chemical bonds (covalent, noncovalent and ionic) van der waal's forces - laws of thermodynamics - redox potential - redox couple - energy states of atom - spin property of electrons – Pauli's exclusion principle - absorption spectrum in molecules.   | <b>13</b> |
| <b>Unit V</b>   | Bioinstrumentation: pH meter - principle and measurement–centrifuge - principle and types – chromatography: principle, types (paper, column, thin layer, gas, ion-exchange and affinity) and uses- Electrophoresis: AGE & PAGE. Optical techniques: Colorimetry: principle and laws (Lambert's and Beer's) – colorimeter and spectrophotometer | <b>13</b> |

*\*Self study topics*

|   |
|---|
| Powerpoint presentation, Seminar, Quiz, Assignment, Demonstration |
|---|

**Text Books:**

1. Verma P.S. and Agarwal, 2001. Cell biology. S. Chand & Company, New Delhi, India.
2. Jain J.L., 1999. Fundamentals of Biochemistry, S. Chand & Company, New Delhi, India.
3. Subramanian P., 2005. Biophysics: Principles and techniques, MJP Publishers, Chennai.

**Reference Books:**

4. De Robertis E.D.P., and De Robertis, E.M.F., 1995. Cell and molecular biology, 8<sup>th</sup>edn. BI. Waverly Pvt. Ltd., New Delhi.
5. Alberts B., Bray, D., Lewis, J. Raff, M. Roberts, K. and Watson, J.D., 1998. Molecular biology the cell. 2nd edn., Garland Pub. Inc., New Delhi.
6. Conn E.E., Stumps, G., Brueming and Doi, R.G., 1987. Outlines of biochemistry, John Wiley & Co., Newyork.
7. Jayaraman J., 1988. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
8. Lee P.J. and Leegood, R.C., 1999. Plant biochemistry and molecular biology. John Wiley & Sons, Chichester, England.
9. Voet and Voet, 1995. Principles of biochemistry, WCB Publishers, London

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | M    | S    | H    | M    | H    |
| CO2      | M    | S    | M    | L    | H    |
| CO3      | M    | S    | H    | H    | H    |
| CO4      | M    | H    | S    | M    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. K. Rajalakshmi                 | Dr.R.Kannan                            | Dr.M.Durairaju |     |
| Dr. E. Neelamathi                  |  |                |     |
|                                    |  |                |     |

|                       |                 |  |                                     |
|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>   | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY406</b> | <b>Course Title</b>  | <b>2018-2021</b>                    |
|                       |                 | <b>MAJOR PRACTICAL – II (CYTOLOGY, ANATOMY &amp; EMBRYOLOGY &amp; BIOCHEMISTRY AND BIOPHYSICS)</b> | <b>Semester 4</b>                   |
| <b>Hrs/Week</b>       | <b>2</b>        |  | <b>Credits 4</b>                    |

#### Course Objective

- To learn various anatomical features of higher plants
- To know the structure and development of anther, ovary, embryo

#### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To recollect the internal structure and functions of angiospermic plants |
| K2 | CO2 | To understand the working principle of selected instruments              |
| K3 | CO3 | To analyze the developmental details of plant embryo                     |
| K4 | CO4 | To prepare permanent micro sections                                      |
| K5 | CO5 | To obtain working knowledge in basic biochemical techniques              |

| <b>Unit</b>     | <b>Content</b>   | <b>Hrs</b> |
|-----------------|--|------------|
| <b>Unit I</b>   | <b>Cell biology:</b> Charts of prokaryotic & eukaryotic cell and cell organelles, DNA, RNA models.   | <b>6</b>   |
| <b>Unit II</b>  | <b>Anatomy:</b> Plant parts, cell - tissue types - mitosis Stem: shoot apex, primary structure of dicot stem ( <i>Tridax</i> and <i>Cucurbita</i> ), monocot stem ( <i>Sorghum</i> ) - normal secondary thickening in a dicot stem ( <i>Thespesia</i> ) - anomalous secondary thickening in <i>Boerhaavia</i> and <i>Dracaena</i> stems. Leaf: stomatal types, dicot ( <i>Nerium</i> ) and monocot (Grass). Root: root apex, primary structure of dicot root ( <i>Dolichos</i> ), monocot root ( <i>Canna</i> ) - normal secondary thickening in and dicot root (Castor). Anomalous secondary thickening in <i>Achyranthes</i> root. | <b>6</b>   |
| <b>Unit III</b> | <b>Embryology:</b> Flower: Permanent slides on structure of anther, ovule, embryosac and endosperm (coconut and areca endosperm) - embryo dissection ( <i>Tridax</i> and <i>Waltheria</i> ), Pollinium dissection ( <i>Calotropis</i> ).   | <b>5</b>   |
| <b>Unit IV</b>  | <b>Biochemistry:</b> Complementary colours, Absorption spectrum & Chlorophyll estimation, Verification of Beer's law, Standard graph preparation & estimation of carbohydrate using spectrophotometer, Estimation of sugar using Benedicts reagent, Estimation of protein (by Lowry method), Estimation of lipid by gravimetric method, Pigment separation using TLC and paper chromatography.   | <b>5</b>   |
| <b>Unit V</b>   | <b>Bioinstrumentation (Experiments &amp; Demonstrations):</b> Centrifuge, Separation of cell organelles using centrifuge, pH meter, Estimation of pH in soil and water samples using pHmeter, preparation of buffers, colorimeter, spectrophotometer, electrophoresis, PCR.  | <b>5</b>   |

Preparation of micro sections of selected plants, plant parts and discussing their anatomical details, Separation and Quantification of biomolecules using simple apparatus, Demonstrations

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | M    | M    | S    | M    | M    |
| <b>CO2</b> | L    | S    | S    | M    | H    |
| <b>CO3</b> | M    | H    | M    | L    | S    |
| <b>CO4</b> | S    | M    | S    | M    | S    |
| <b>CO5</b> | H    | M    | S    | M    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. K. Rajalakshmi                 | Dr. R. Kannan                          | Dr.M.Durairaju |     |
| Dr. E. Neelamathi                  |  |                |     |
|                                    |  |                |     |

|                       |                 |  |                                     |
|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>   | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY4N3</b> | <b>Course Title</b>  | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (NON MAJOR) – REMOTE SENSING AND NATURAL RESOURCE MANAGEMENT</b> | <b>Semester 4</b>                   |
| <b>Hr/Week</b>        | <b>1</b>        |  | <b>Credits 4</b>                    |

#### Course Objective

- To study the basic principles of remote sensing techniques
- To understand the role of GIS, GPS in managing Natural resources

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To list down the natural resources and biosphere reserves |
| K2 | CO2 | To understand the concept of Remote sensing               |
| K3 | CO3 | To apply remote sensing techniques in Resource management |
| K4 | CO4 | To update the recent trends in remote sensing techniques  |

| <b>Unit</b>     | <b>Content</b>   | <b>Hrs</b> |
|-----------------|--|------------|
| <b>Unit I</b>   | Natural resources – Terrestrial and aquatic (Forest and marine resources) – Biodiversity – Concept – Conservation strategies ( <i>in situ</i> and <i>ex situ</i> ) – Biosphere reserves – National Parks and Wildlife sanctuaries – IUCN species status. | <b>3</b>   |
| <b>Unit II</b>  | Remote sensing – Concept, platforms for remote sensing, satellites, sensors and satellite data products – Interpretation of remotely sensed data-Visual interpretation and digital analysis.   | <b>3</b>   |
| <b>Unit III</b> | Remote sensing and vegetation studies – Forest mapping-Land cover classification and change detection studies.   | <b>2</b>   |
| <b>Unit IV</b>  | Remote sensing for marine resource management – Coastal vegetation surveys – Marine pollution monitoring.  | <b>2</b>   |
| <b>Unit V</b>   | Recent trends in remote sensing techniques – Role of GIS (Geographical Information System) and GPS (Global Positioning System), IRNSS – National and International Agencies and their achievements.  | <b>2</b>   |

Power point presentations, Quiz,

#### Text Books:

1. Thomas Eugene Avery and GraydonLennis Berlin, 1992. Fundamentals of Remote sensing and Airphoto Interpretation.
2. Agrawal K. C., 1996. Biological diversity, Agro Botanical Publishers, New Delhi.

#### Reference Books:

3. Solbris, Van Embden and Van dordt., 1994. Biodiversity and global changes. CAB International, International Union of Biological Sciences, Wallingford.

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | H    | M    | M    | M    | L    |
| <b>CO2</b> | M    | S    | M    | M    | S    |
| <b>CO3</b> | H    | S    | M    | L    | S    |
| <b>CO4</b> | M    | M    | M    | M    | S    |

S-Strong; H-High; M-Medium; L-Low

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr. K. Rajalakshmi                         | Dr. R. Kannan                                  | Dr.M.Durairaju |            |
|  |  |                |            |
|  |  |                |            |

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|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                                  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY4N4</b> | <b>Course Title</b>                                     | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (NON MAJOR) -BIOINFORMATICS</b> | <b>Semester 4</b>                   |
| <b>Hr/Week</b>        | <b>1</b>        |   | <b>Credits 2</b>                    |

#### Course Objective

- To introduce classical bioinformatics theory to students
- To focus computer science techniques used in biological studies

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To introduce Bioinformatics and Biological databases                            |
| K2 | CO2 | To comprehend the origin of life and genetic code                               |
| K3 | CO3 | To know-how the gene finding, protein prediction and genetic algorithm          |
| K4 | CO4 | To analyze the phylogeny between species using pattern recognition and homology |

| Unit            | Content   | Hrs      |
|-----------------|---|----------|
| <b>Unit I</b>   | Life - origin and evolution – biomolecules – book of life - genetic code – genomics and proteomics – Human Genome Project.                              | <b>3</b> |
| <b>Unit II</b>  | Introduction to bioinformatics – biological databases and searching tools – virtual library – servers for bioinformatics – IT tools for bioinformatics. | <b>3</b> |
| <b>Unit III</b> | Genetic algorithm – sequence analysis – alignment and similarity search-pattern recognition – structure prediction.                                     | <b>2</b> |
| <b>Unit IV</b>  | Gene finding – protein prediction – tools and databases for biomolecular visualization – drug designing.  | <b>2</b> |
| <b>Unit V</b>   | Phylogenetic analysis – tools and databases for phylogenetic tree construction – homology – orthology – paralogy – analogy.                             | <b>2</b> |

Powerpoint presentations, Quiz

#### Text Books:

1. Lesk A.M.2002, Introduction to Bioinformatics, Oxford University Press,Oxford.
2. Parthasarathy S., 2008. Essentials of programming in C for life sciences. Ane Books India, New Delhi.
3. Sundararajan S. and R. Balaji, 2002. Introduction to Bioinformatics, Himalaya Publishing House – Mumbai.

#### Reference Books:

4. Chakraborty C., 2004. Bioinformatics Approaches and Application. Chawla offset printers – Delhi.
5. Westhead D.R., J. Parish and R.M.Twyman, 2003. Bioinformatics (instant notes) Viva books private limited – New Delhi.
6. KhanI.A.,and A. Khanum, 2002, Emerging trends in Bioinformatics, Ukaaz Publications.



| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | M    | S    | M    | M    | S    |
| <b>CO2</b> | H    | S    | L    | M    | S    |
| <b>CO3</b> | M    | S    | M    | M    | S    |
| <b>CO4</b> | M    | S    | L    | M    | S    |

S-Strong; H-High; M-Medium; L-Low

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr.R.Kannan                                | Dr.R.Kannan                                    | Dr.M.Durairaju |            |
|  |  |                |            |
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|-----------------------|-----------------|--------------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>         | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY507</b> | <b>Course Title</b>            | <b>2018-2021</b>                    |
|                       |                 | <b>TAXONOMY OF ANGIOSPERMS</b> | <b>Semester 5</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |                                | <b>Credits 4</b>                    |

### Course Objective

- To learn nomenclature systems and to identify the plants
- To introduce modern trends in taxonomy
- To know the economic uses of plants

### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To introduce and list down the technical terms used in taxonomy             |
| K2 | CO2 | To understand the principle and classification of angiosperms               |
| K3 | CO3 | To create interest in identifying flowering plants in and around the campus |
| K4 | CO4 | To get hands-on training in preparing herbarium                             |
| K5 | CO5 | To update the Botanical nomenclature, norms and digital taxonomy            |

| Unit            | Content   | Hrs       |
|-----------------|---|-----------|
| <b>Unit I</b>   | Introduction to plant taxonomy – principles - morphology and technical terms used in taxonomy (root, stem, leaf, inflorescence, flowers and fruits) – Systems of classification – natural (Bentham & Hooker) and artificial (Linnaeus) - merits and demerits                          | <b>13</b> |
| <b>Unit II</b>  | Botanical nomenclature - ICBN (ICN) – typification - author citation - valid publication - herbarium techniques – floras - <b>*Botanical survey of India (BSI)</b> and its function. Modern trends in taxonomy - digital taxonomy - online herbaria - <b>*Royal botanical garden.</b> | <b>13</b> |
| <b>Unit III</b> | Detailed study of the range of characters and economic importance of the families: Polypetalae: Annonaceae, Capparidaceae, Rutaceae, Anacardiaceae, #Fabaceae, Cucurbitaceae and Apiaceae. Gamopetalae: Rubiaceae, Apocynaceae, Asteraceae,   | <b>13</b> |
| <b>Unit IV</b>  | Detailed study of the range of characters and economic importance of the families: Gamopetalae: #Asclepiadaceae, Scrophulariaceae, Acanthaceae, and #Lamiaceae. Monochlamydeae: Amaranthaceae, Euphorbiaceae.   | <b>13</b> |
| <b>Unit V</b>   | <b>Monocots:</b> #Orchidaceae, Cannaceae, #Liliaceae, Arecaceae, and Poaceae. #Pollination mechanisms to be included.   | <b>13</b> |

*\*Self study topics*

|  |
|--|
| Field study, Identification of plants in the campus, Herbarium preparation |
|--|

**Text Books:**

1. Chopra G.L., 2004 Angiosperm (Systematics and life cycles), Pradeep publications. Jalandhar.
2. PandeyB.P., 1997. Taxonomy of angiosperms. Chand and Co. Ltd. New Delhi.
3. PandeyB.P., 1980.Economic Botany, Chand and Co. Ltd. New Delhi.

**Reference books:**

4. SharmaO.P., 1993. Plant taxonomy, Tata McGraw-Hill Education,
5. VasishtaP.C., 1994. Taxonomy on angiosperms. S. Chand & Co., New Delhi
6. Gamble J.S.1967. Flora of Madras, Vol. I, II & III. Govt. of India.
7. Jeffrey C., 1976. An introduction to plant taxonomy. Allied publication.
8. Lawrence .G.H.M., 1964. An introduction to plant taxonomy, Central Book dept., Allahabad.
9. Porter C.L., 1969. Taxonomy of flowering plants. Eurassia Publication House, New Delhi.
10. Rendle A.B., 1980. The classification of flowering plants (Vol. 1& 2), Vikas students Edn.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | S    | H    | H    | M    | S    |
| CO2      | S    | H    | M    | H    | M    |
| CO3      | S    | M    | M    | S    | M    |
| CO4      | S    | M    | S    | S    | S    |
| CO5      | S    | L    | L    | S    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. M. Latha Isabel                | Dr.R.Kannan                            | Dr.M.Durairaju |     |
| Dr. A. Logamadevi                  |  |                |     |
|                                    |  |                |     |

|                       |                 |   |                                     |
|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY508</b> | <b>Course Title</b>                     | <b>2018-2021</b>                    |
|                       |                 | <b>MICROBIOLOGY AND PLANT PATHOLOGY</b> | <b>Semester 5</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |   | <b>Credits 4</b>                    |

#### Course Objective

- To know the microbial biodiversity
- To learn the techniques in bacteriology and immunology
- To know plant diseases and its control

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To appreciate the diversity of microbes                             |
| K2 | CO2 | To understand the basic defence mechanism and concept of Immunology |
| K3 | CO3 | To analyse the food and water samples for contamination             |
| K4 | CO4 | To get hands-on training in culturing microbes                      |
| K5 | CO5 | To learn economically important plant disease                       |

| Unit            | Content  | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | <b>Bacteriology:</b> Bacteria - morphology and ultra structure – major features – nutritional types – bacterial respiration - growth and reproduction – <b>*economic importance</b> - culture media and techniques (spread plate, pour plate and streak plate).  | <b>15</b> |
| <b>Unit II</b>  | <b>Virology:</b> Virus – characteristics - ultra structure, shape, classification (bacterial, plant and animal viruses) - transmission and reproduction (HIV, Rabies & T4 Phage).  | <b>15</b> |
| <b>Unit III</b> | <b>Immunology:</b> host microbe interaction - antigen, antibody and vaccines - antibiotics - source and mode of action of penicillin and streptomycin - control of microorganisms - chemotherapy.  | <b>15</b> |
| <b>Unit IV</b>  | <b>Food and water microbiology:</b> microbial flora of fresh food - food spoilage and poisoning (botulism) - <b>*food preservation</b> -microbial flora of milk - pasteurization and dairy products - cheese production- production of ethanol, vinegar and citric acid. Microbiology of water - detection of coliforms - MPN and MFT. | <b>15</b> |
| <b>Unit V</b>   | <b>Plant pathology:</b> Introduction - brief history - classification of plant diseases - Koch's postulate - symptoms, causal organism and control measures of bacterial (citrus canker), fungal (tikka disease of ground nut, paddy blast, and red rot of sugarcane) and viral (TMV) diseases – biocontrol - biopesticides.           | <b>15</b> |

*\*Self study topics*

|  |
|--|
| Powerpoint presentation, Field observation of diseased plants, Quiz, Seminar, Assignment |
|--|

**Text Books:**

1. Ananthanarayanan and Jayaramanikar, Textbook of microbiology, 2017 (10<sup>th</sup> Edn.)Universities press, Hyderabad.
2. Pelczar JR., M.J., R.D. Reid and E.C.S. Chan, 1983. Microbiology (4<sup>th</sup>ed.) Tata McGraw Hill Publishing Company Pvt. Ltd., New Delhi.
3. Purohit, S.S., Microbiology – Fundamentals & applications, 2006, Agro Bios (India)..
4. Sharma, .P.D., Plant Pathology, Deep and Deep Publications, New Delhi.

**Reference Books:**

1. Atlas R.M., 1996. Principles of Microbiology. Wm.C. Brown Publishers
2. Black, J.G., Microbiology –II Edition, Prentice Hall publications.
3. Churchill, Immunobiology- The Immune System in Health and Disease. Livingstone publication. New York.
4. Hans G. Schlegel, General Microbiology, 7<sup>th</sup>ed, Cambridge Low Price Edns
5. Kenneth J. Ryan, C. George Ray, Sherris Medical Microbiology: An Introduction to Infectious Diseases.
6. Prescott, L.M., Harley JP and Klein DA., 1990. Microbiology. Wan C.Publishers.
7. Rose, A.H., Chemical Microbiology, 3<sup>rd</sup>ed, Butterworth World Student Reprints.
8. Salle.A.J., Fundamental Principles of Bacteriology, Tata McGraw Hill.
9. Stanier R., General Microbiology, 5<sup>th</sup>ed, Macmilan Press ltd.

| CO \ PO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|---------|------|------|------|------|------|
| CO1     | S    | H    | H    | M    | H    |
| CO2     | M    | S    | M    | M    | M    |
| CO3     | M    | H    | H    | L    | M    |
| CO4     | M    | M    | H    | L    | S    |
| CO5     | M    | M    | M    | H    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. A. Logamadevi                  | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
|                                    |  |                |     |

|                       |                 |                                 |                                     |
|-----------------------|-----------------|---------------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>          | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY509</b> | <b>Course Title</b>             | <b>2018-2021</b>                    |
|                       |                 | <b>GENETICS &amp; EVOLUTION</b> | <b>Semester 5</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |                                 | <b>Credits 4</b>                    |

#### Course Objective

- To learn the principles and theories of inheritance
- To know the concepts of classical and modern genetics

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To revise the Mendelian Genetics                                  |
| K2 | CO2 | To understand the concept of gene and molecular basis of heredity |
| K3 | CO3 | To learn the significance of Meiosis                              |
| K4 | CO4 | To analyse the causes of mutation and DNA repair mechanisms       |

| <b>Unit</b>     | <b>Content</b>  | <b>Hrs</b> |
|-----------------|---|------------|
| <b>Unit I</b>   | Introduction to Genetics - Mendelian inheritance- <b>*Mendel and his experiments with pea plant</b> – Mendel's laws - law of dominance – incomplete dominance – law of segregation - law of independent assortment – Monohybrid cross - dihybrid cross - back and test crosses.   | <b>13</b>  |
| <b>Unit II</b>  | Non-Mendelian inheritance -interaction of genes –complementary genes – supplementary genes – duplicate genes - inhibitory genes – polygenic inheritance – multiple alleles and blood groups in man.   | <b>13</b>  |
| <b>Unit III</b> | Meiosis - crossing over – chromosome maps – linkage – sex linkage – types of sex linkage – sex linked inheritance – cytoplasmic inheritance – chloroplast and mitochondrial inheritance - sex determination – chromosomal – genic balance – hormonal and environmental sex determination.   | <b>13</b>  |
| <b>Unit IV</b>  | Chemical basis of heredity - DNA as genetic material (McCleod and Mc Carty experiments) - RNA as genetic material (Frankel-Conrat experiment) – concept of gene - genetic code - features and properties – prokaryotic (lac operon) and eukaryotic gene expression and regulation   | <b>13</b>  |
| <b>Unit V</b>   | Mutations - causes of mutation - mutagenic agents – gene mutation - DNA repair mechanisms (photo reactivation, excision and recombinational) - chromosomal aberrations - ploidy - significance of polyploidy. Introduction to Evolution – <b>*origin of life</b> – theories of evolution – Lamarck, Darwin and Hugo De Vries – Wisemann theory. | <b>13</b>  |

*\*Self study topics*

|  |
|--|
| Powerpoint presentation, Slides, Quiz, Seminar, Assignment |
|--|

**Text Books:**

1. Sinnot, Dunn and Dobshansky, Principles of Genetics. McGraw Hill Pub.
2. Verma P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.
3. Chawala H. S. 2002. Introduction to Plant Biotechnology. Oxford & IBH Publishing Company, New Delhi.
4. Gifford, E. M. and Foster, A.S. 1989. Morphology and evolution of vascular plants. W.H. Freeman & Co., Newyork.

**Reference Books:**

5. Verma P. S. and V. K. Agrawal. 2006. Genetics. S. Chand & Company Ltd., New Delhi.
6. Goodenough V., 1992. Genetics, Saunders College publishing.
7. Kenny *et al.*, Gene regulation and its expression. Plenum press.
8. Lawin, Molecular basis of gene expression. Wiley & Sons.
9. Lewin B. 2002. Genes VII. OxfordUniversity Press, Oxford.
10. Snustad D. P. and M. J. Simmons. 2000. Principles of Genetics. John Wiley & Sons,Inc.,
11. Strickberger M. W. 1990. Genetics (3rd Ed.). Macmillan Publishing Company. USA.
12. Watson J.D. *et al.*, Molecular Biology of the gene. The Benjamin/Cummings.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | M    | H    | M    | M    | L    |
| CO2      | M    | S    | L    | M    | S    |
| CO3      | H    | S    | M    | M    | M    |
| CO4      | M    | S    | M    | M    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. R. Kannan                      | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
|                                    |  |                |     |

|                       |                 |                            |                                     |
|-----------------------|-----------------|----------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>     | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY510</b> | <b>Course Title</b>        | <b>2017-2020</b>                    |
|                       |                 | <b>GENETIC ENGINEERING</b> | <b>Semester 5</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |                            | <b>Credits 4</b>                    |

#### Course Objective

- To study the basic principles of Genetic engineering
- To learn the tools and techniques in Genetic engineering

#### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To revisit the molecular tools in genetic engineering                                  |
| K2 | CO2 | To understand the principle of gene transfer blotting techniques and DNA amplification |
| K3 | CO3 | To analyse the molecular markers and its applications                                  |
| K4 | CO4 | To apply the rDNA safety guidelines  |

| Unit            | Content   | Hrs       |
|-----------------|---|-----------|
| <b>Unit I</b>   | <b>*Scope and history of genetic engineering</b> - molecular tools in genetic engineering: restriction endonucleases, ligases, phosphatases, methylases, and kinases.   | <b>13</b> |
| <b>Unit II</b>  | Host cells - vectors- nomenclature - properties of good vector – types of vectors – plasmid ( <i>T<sub>i</sub></i> , <i>PBR<sub>322</sub></i> & <i>pUC18</i> ), bacteriophage ( $\lambda$ phage) - artificial chromosome vectors (BAC & YAC) - transposable elements. | <b>13</b> |
| <b>Unit III</b> | Gene transfer methods: Natural and Direct – construction of genomic and cDNA libraries – amplification of DNA - polymerase chain reaction (PCR)   | <b>13</b> |
| <b>Unit IV</b>  | Selection and screening of rDNA – DNA hybridization – DNA probes - blotting techniques (southern, northern and western blots) - molecular markers (RAPD, RFLP and SNPs).  | <b>13</b> |
| <b>Unit V</b>   | <b>*Applications of genetic engineering</b> in Biotechnology- DNA Finger printing technique and its applications – DNA barcoding – Biochip- DNA vaccine - recombinant DNA safety guidelines.  | <b>13</b> |

*\*Self study topics*

|   |
|---|
| Powerpoint presentation, Quiz, Seminar, Assignment, Case study on the DNA finger printing technique |
|---|

#### Text Books:

1. Dubey R.C., 1995. A text book on Biotechnology (2<sup>nd</sup> Ed), S. Chand & Company Ltd., New Delhi.
2. Gupta P. K., 2001. Elements of Biotechnology, Rastogi Publications. Meerut.
3. Satyanarayana U., 2005. Biotechnology. Books and Allied (P) Ltd., Kolkata.



**Reference Books:**

4. Brown T.A., 1995. Gene Cloning- an introduction. Chapman and Hall Publications (3<sup>rd</sup> Ed).New York.
5. Desmond S.T. Nicholl, 2004. An Introduction to Genetic Engineering (2<sup>nd</sup> Ed). CambridgeUniversity Press.
6. Freifelder D., 1994.Molecular Biology, NarosaPub. Inc., Boston, London.
7. Freifelder D., 1998. Microbial Genetics. Jones and Barlette Pub. Inc., Boston
8. Glick B.R. and Pastumak, J.J.,1998. Molecular Biotechnology – Principles and application of recombinant DNA (2<sup>nd</sup> Ed) ASM Press, Washington.
9. Glover D.M., 1980. Genetic Engineering, Cloning DNA, Chapman and Hall, New York.
10. Nicholl Desmond S.T., 2002. An Introduction to Genetic Engineering (Second Edition), CambridgeUniversity Press.
11. Old R.W. and Primrose S.B., 1993. Principles of Gene manipulation an introduction to Genetic engineering, Blackwell Scientific Publications.
12. Primrose S.B. and Twyman R.M., 2008. Gene Manipulation. Blackwell Pub. USA.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | M    | H    | M    | M    | H    |
| CO2      | M    | S    | M    | M    | H    |
| CO3      | L    | S    | M    | S    | S    |
| CO4      | M    | S    | M    | L    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. K. Rajalakshmi                 | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
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|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                         | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY511</b> | <b>Course Title</b>                            | <b>2018-2021</b>                    |
|                       |                 | <b>ELECTIVE I - MATHEMATICS FOR BIOLOGISTS</b> | <b>Semester 5</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |  | <b>Credits 5</b>                    |

#### Course Objective

- To acquire knowledge on basic arithmetics and biostatistical methods
- To introduce the application of computers in Biostatistics

#### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To revise the basic arithmetic and number system                     |
| K2 | CO2 | To understand the role of mathematics in solving biological problems |
| K3 | CO3 | To introduce the statistical methods for analyzing a data            |
| K4 | CO4 | To analyse and interpret a sample data using various methods         |
| K5 | CO5 | To update the computer knowledge in presenting the data              |

| Unit            | Content   | Hrs       |
|-----------------|---|-----------|
| <b>Unit I</b>   | Maths in Biology – manipulating numbers – units and conversion – molarities and dilutions – areas and volumes – exponents and logs.   | <b>13</b> |
| <b>Unit II</b>  | Matrix – types - addition – subtraction - multiplication – determinants – inverse matrix – solving a system of linear equations.  | <b>13</b> |
| <b>Unit III</b> | Biostatistics – introduction - techniques: <i>Frequency distribution</i> - * <b>collection</b> , analysis and graphical representation of data - measures of central tendency: mean, median and mode - measures of dispersion: range, standard deviation, coefficient of variation and correlation. | <b>13</b> |
| <b>Unit IV</b>  | <i>Theoretical distribution</i> – binomial, poisson and normal distribution – <i>Test of significance</i> - Chi-square test – test for goodness of fit (2x2 contingency table, Yate’s correction to be omitted) - Student ‘t’ test – ANOVA (one way classification).                                | <b>13</b> |
| <b>Unit V</b>   | Softwares for biostatistics – * <b>MS Office</b> - Word &Powerpoint - Excel: spreadsheet – formula bar - standard deviation – correlation – t- test – Chi square test – ANOVA (one way) – charts.   | <b>13</b> |

**Note:** Special instruction to question setters: In either or type of questions in sections B and C, one must be a problem and the other will be a question for descriptive answer.

\*Self study topics

|  |
|--|
| Worksheets, Take home assignments, Seminar, Quiz |
|--|

#### Text Books:

1. Alexis Leona and Mathews Leon, 1999. Introduction to computers. Leon Tech World, Chennai.

2. Cann Alan J., 2003. Maths from scratch for Biologists. John Wiley & Sons Ltd.,Chichester, England.
3. Gurumani, N., 2005. An introduction to Biostatistics. MJP Publishers, Chennai.

**Reference Books:**

4. ManicavachagomPillay, T.K., T. Natarajan and K.S. Ganapathy, 2006. Algebra Vol.II. S. Viswanathan (printers & publishers) Pvt Ltd., Chennai.
5. Prasad, S., 2001. Elements of Biostatistics. Rastogi publications, Meerut.
6. Edward Batschlet, 1973. Introduction to mathematics for life sciences. Springer Verlag, New York.
7. Pranab Kumar Banerjee, 2004. Introduction to Biostatistics. S. Chand & Company Ltd., New Delhi.
8. Schwartz J.T.,1961. Introduction to matrices and vectors. McGraw Hill Book Company, INC., New York.
9. Simons S., 1964. Vector analysis for mathematicians, scientists and engineers. Pergamon press, The Macmillan Company, New York.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | M    | M    | M    | M    | H    |
| CO2      | H    | H    | M    | M    | H    |
| CO3      | H    | M    | L    | M    | S    |
| CO4      | L    | M    | M    | M    | S    |
| CO5      | M    | M    | L    | H    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. K. Rajalakshmi                 | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
|                                    |  |                |     |

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|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                                       | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY5S1</b> | <b>Course Title</b>  | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (MAJOR) – MICROSCOPIC TECHNIQUES</b> | <b>Semester 5</b>                   |
| <b>Hr/Week</b>        | <b>1</b>        |  | <b>Credits 2</b>                    |

#### Course Objective

- To study the principles and applications of microscopy and microtomy

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To revise the types of microscopes                            |
| K2 | CO2 | To understand the principle of microscopy                     |
| K3 | CO3 | To obtain the working knowledge on Microscopy and Micrometry, |
| K4 | CO4 | To prepare microsection                                       |

| Unit            | Content   | Hrs      |
|-----------------|---|----------|
| <b>Unit I</b>   | Microscopy – optical principles – light sources – eye piece and lenses – condenser – ergonomics.  | <b>3</b> |
| <b>Unit II</b>  | Working principles and types of microscopes – compound – dark field – SEM – TEM.  | <b>3</b> |
| <b>Unit III</b> | Microscopic techniques – sample preparation – sectioning – fixation – staining – slide preparation – smear – squash – maceration – whole mount. | <b>2</b> |
| <b>Unit IV</b>  | Micrometry- ocular and stage –microscopic drawings, camera lucida, microtome- types and working principles                                      | <b>2</b> |
| <b>Unit V</b>   | Photomicrographic techniques – microphotography – photographic processing – developing – printing – computerized microscopy.                    | <b>2</b> |

Powerpoint presentation, Demonstration

#### Text Books:

- Johanson D.A., 1940. Plant Microtechnique Tata McGraw Hill, New York.
- Sase john E., 1964. Botanical Microtechnique - Oxford & IBH.
- Gray P., 1964. Hand book of Basic Microtechniques–McGraw hill, New York.

#### Reference Books:

- Alan Peacock H., 1966. Elementary Microtechnique, Edward Arnold publishers Ltd.UK
- Prescott L.M., J.P. Harley and C.A. Klein, 2003. Microbiology, 5thEdition McGraw Hill Publishing Company Limited. New York.
- Pelczar Jr. M.J., E.C.S. Chan and N.R. Kreig, 2004. Microbiology.5th Edition. Tata McGraw-Hill Publishing Company. New Delhi

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | M    | H    | H    | H    | M    |
| <b>CO2</b> | M    | S    | L    | M    | H    |
| <b>CO3</b> | M    | S    | M    | M    | H    |
| <b>CO4</b> | H    | M    | M    | L    | H    |

S-Strong; H-High; M-Medium; L-Low

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr. A. Logamadevi                          | Dr.R.Kannan                                    | Dr.M.Durairaju |            |
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| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                                     | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY5S2</b> | <b>Course Title</b>  | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (MAJOR) – MUSHROOM CULTIVATION</b> | <b>Semester 5</b>                   |
| <b>Hr/Week</b>        | <b>1</b>        |  | <b>Credits 2</b>                    |

#### Course Objective

- To acquire knowledge on the mushroom culture

#### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To identify edible mushrooms from poisonous ones |
| K2 | CO2 | To understand the mushroom cultivation           |
| K3 | CO3 | To know-how the mushroom culture techniques      |
| K4 | CO4 | To create interest in preparing mushroom recipes |

| Unit            | Content  | Hrs      |
|-----------------|--|----------|
| <b>Unit I</b>   | Introduction to mushroom cultivation: General characters, structure and reproduction of mushrooms – Identification of mushrooms- types of mushroom- Poisonous mushroom.  | <b>2</b> |
| <b>Unit II</b>  | Uses of mushroom: Nutritive and food value, Medicinal value  | <b>2</b> |
| <b>Unit III</b> | Mushroom culture techniques: Mushroom shed construction- spawn preparation - medium preparation -spawn running - incubation. Cultivation methods for button & oyster mushrooms - disease and control measures. | <b>3</b> |
| <b>Unit IV</b>  | Post harvest operations: Harvesting – storage and preservation – spoilage of mushrooms - packing – marketing.  | <b>3</b> |
| <b>Unit V</b>   | Mushroom recipes: Mushroom soup, sandwich, gravy, omelette, mushroom chilly, manchurian and briyani.   | <b>2</b> |

Powerpoint presentation, Demonstration,

#### Text Books:

- Nita bahl, 1988. Hand book of mushrooms, Vol. II, IBH publishers.
- Kannian, 1980. Text book of Mushroom, Today and Tomorrow publishers, Chennai.

#### Reference Books:

- Pathak V.N., Yadav N. and Gour M., 2000. Mushroom production and processing technology, Agrobios (India) Ltd.
- Chang S.T. and N.A.Hayer, 2002. The biology and cultivation of edible mushrooms.
- Reeti Singh and U.C. Singh, 2005. Modern Mushroom cultivation, Agrobios (India) Ltd.

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | S    | S    | M    | S    | M    |
| <b>CO2</b> | M    | H    | L    | S    | M    |
| <b>CO3</b> | M    | H    | S    | S    | M    |
| <b>CO4</b> | M    | H    | S    | S    | M    |

S-Strong; H-High; M-Medium; L-Low

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr. E. Neelamathi                          | Dr.R.Kannan                                    | Dr.M.Durairaju |            |
|  |  |                |            |
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|-----------------------|-----------------|-------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY612</b> | <b>Course Title</b>     | <b>2018-2021</b>                    |
|                       |                 | <b>PLANT PHYSIOLOGY</b> | <b>Semester 6</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |                         | <b>Credits 4</b>                    |

#### Course Objective

- To know the cellular functions of plants
- To understand the physiological functions of plants

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To revisit the Plant function and Plant movements                       |
| K2 | CO2 | To understand the concept of water potential, water transport           |
| K3 | CO3 | To analyse the role of photosynthesis and respiration in plant function |
| K4 | CO4 | To enlist various plant growth regulators                               |
| K5 | CO5 | To know the stress physiology of plants and                             |

| Unit            | Content   | Hrs       |
|-----------------|---|-----------|
| <b>Unit I</b>   | Water relations - water potential and its components - *osmosis - absorption of water – absorption of minerals - mineral nutrition.   | <b>13</b> |
| <b>Unit II</b>  | Transpiration - its kinds, significance and factors - stomatal mechanisms - theories of ascent of sap - translocation of solutes - photosynthesis - light and dark reactions C <sub>3</sub> - C <sub>4</sub> pathways - photorespiration. | <b>13</b> |
| <b>Unit III</b> | Respiration - aerobic - glycolysis - Krebs' cycle – electron transport system (ETS).- anaerobic fermentation - Nitrogen metabolism - nitrogen cycle – biological nitrogen fixation - Biosynthesis of aminoacids – protein synthesis.      | <b>13</b> |
| <b>Unit IV</b>  | Fat metabolism – fat synthesis – fat degradation – glyoxylate cycle. Plant growth and development - growth regulators - auxins, gibberellins, kinetins,* <b>ethylene and ABA.</b>   | <b>13</b> |
| <b>Unit V</b>   | Physiology of flowering - photoperiodism – vernalization – biological clocks –Water and salt stress - Plant movements – seed dormancy - senescence.   | <b>13</b> |

Powerpoint presentations, Simple Experiments, Demonstrations, Seminar, Quiz, Assignments

#### Text Books:

1. Verma 1984. Plant physiology. Allied publishers, New Delhi.
2. Jain V.K., 2008. Fundamentals of Plant Physiology. S. Chand & Company Ltd., Ram Nagar, New Delhi.

#### Reference Books:

3. Bidwell R.G.S., 1982. Plant physiology. Collier Mac Million International edn.
4. Devlin R.M., 1969. Plant Physiology. CBS Publishers & Distributors.



5. Salisbury Frank and L.W. Ross, 1986. Plant physiology. CBS Publishers
6. Srivastava, 1982. Plant physiology, CBS Publishers & Distributors.

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | M    | S    | H    | L    | M    |
| <b>CO2</b> | M    | S    | H    | M    | L    |
| <b>CO3</b> | M    | S    | H    | M    | H    |
| <b>CO4</b> | M    | H    | M    | M    | L    |
| <b>CO5</b> | M    | H    | L    | H    | H    |

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr. M. Latha Isabel                        | Dr. R. Kannan                                  | Dr.M.Durairaju |            |

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|-----------------------|-----------------|---------------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>          | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY613</b> | <b>Course Title</b>             | <b>2018-2021</b>                    |
|                       |                 | <b>ECONOMIC AND ETHNOBOTANY</b> | <b>Semester 6</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |                                 | <b>Credits 4</b>                    |

**Course Objective**

- To acquire knowledge on useful medicinal plants, cultivation methods
- To know the secondary metabolites and therapeutic potentials of plants

|    |     |  |
|----|-----|--|
| K1 | CO1 | To revise the traditional system of medicine   |
| K2 | CO2 | To understand the phytochemistry and medicinal principles of selected plants                   |
| K3 | CO3 | To analyse the distribution, cultivation, extraction and uses of economically important plants |
| K4 | CO4 | To prepare herbal formulations   |
| K5 | CO5 | To create awareness in conserving medicinal plants   |

**Course Outcome**

\*Self study topics

Powerpoint presentation, Demonstration

### Text Books:

1. Wallis T.E., 1985. Text book of Pharmacognosy, 5<sup>th</sup> edition, CBE publishers and distributors, New Delhi.
2. Ali M., 1997. Text book of Pharmacognosy, CBS publishers and distributors, New Delhi.
3. Kumar N.C., (1993). An Introduction to Medical botany and Pharmacognosy. EmkayPublications, New Delhi.

### Reference Books:

4. Gokhale S.B., Kokate C.K., Purohit A.P. 1982. NiraliPrakasham Publisher, Pune.
5. Kirtikar and Basu, 1980. Indian medicinal plants Vol. IV, Panni press, Allahabad.

| Unit            | Content  | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | Economic botany: Importance of plants and plant products- Botanical description, cultivation methods and uses of food plants: Cereals- (rice, wheat), Pulses- (gram, pea), Vegetables- (potato, tomato), Spices- (coriander, ginger), Beverages- (tea, coffee), Rubber ( <i>Hevea</i> ), Sugar (Sugarcane).  | <b>13</b> |
| <b>Unit II</b>  | Distribution, method of cultivation, extraction, industrial processing and uses of fibre yielding plants- (Cotton, Jute), Oil yielding plants- (Coconut, Ground nut) - General account and sources of timber and biofuels.   | <b>13</b> |
| <b>Unit III</b> | EthnoBotany: Scope- outline of traditional system of medicine: Siddha- Ayurveda- Unani- Pharmacognosy, Ethnic groups *Nutraceuticals and bioactive compounds: biological role and applications of alkaloids and glycosides. Medicinal uses of bacteria (Actinomycetes), Algae ( <i>Spirulina</i> ), Fungi ( <i>Penicillium</i> ), Pteridophytes ( <i>Lycopodium</i> ) and Gymnosperms ( <i>Ginkgo</i> ). | <b>13</b> |
| <b>Unit IV</b>  | Distinguishing features, phytochemistry and medicinal properties of the following plants. Whole plant ( <i>Phyllanthus amarus</i> ), Roots ( <i>Rauwolfia serpentina</i> ), Rhizome ( <i>Curcuma longa</i> ), Leaves ( <i>Ocimum sanctum</i> ), Flower ( <i>Hibiscus rosasinensis</i> ), Fruits ( <i>Embllica officinalis</i> ) and Seeds ( <i>Myristica fragrans</i> ).                                 | <b>13</b> |
| <b>Unit V</b>   | Herbal formulations - Poultices and compresses. Plant crude drugs- adulteration- types, methods of collection, processing and storage- practices- evaluation of crude drug- *conservation of medicinal plants – sacred grooves.  | <b>13</b> |

6. Harborne J.B., 1998. Phytochemical methods – A guide to modern technique of plant analysis, 3<sup>rd</sup> edn., Chapman & Hall, UK.
7. Wijeskera R.O.B., 1991. The medicinal plant industry, CRC press, Boston, London.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | M    | S    | H    | M    | M    |
| CO2      | L    | S    | H    | H    | L    |
| CO3      | M    | S    | H    | L    | M    |
| CO4      | L    | H    | M    | M    | L    |
| CO5      | M    | H    | L    | H    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. A. Logamadevi                  | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
|                                    |  |                |     |

|                       |                 |                            |                                     |
|-----------------------|-----------------|----------------------------|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>     | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY614</b> | <b>Course Title</b>        | <b>2018-2021</b>                    |
|                       |                 | <b>PLANT BIOTECHNOLOGY</b> | <b>Semester 6</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |                            | <b>Credits 4</b>                    |

#### Course Objective

- To acquire knowledge on plant tissue culture
- To study the role of Biotechnology in food, agriculture and pharmaceutical industries.

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To list down the sterilization techniques   |
| K2 | CO2 | To understand the concept of totipotency, micropropagation and haploid production |
| K3 | CO3 | To analyse the gene transfer methods  |
| K4 | CO4 | To know the technicalities in producing transgenic plants                         |

| Unit            | Content   | Hrs       |
|-----------------|---|-----------|
| <b>Unit I</b>   | Introduction to plant tissue culture – concept of totipotency and pluripotency - sterilization techniques – solid & liquid medium (MS medium, Whites medium) – callus and cell suspension culture.  | <b>13</b> |
| <b>Unit II</b>  | Micropropagation – stages of micropropagation – applications - meristem culture – somatic embryogenesis – principle and applications of somaclonal variation & cryopreservation.  | <b>13</b> |
| <b>Unit III</b> | Haploid production - anther culture – pollen culture – embryo culture and rescue - protoplast isolation, fusion and culture– somatic hybridization – cybrids- <b>*synthetic seeds.</b>  | <b>13</b> |
| <b>Unit IV</b>  | Genetic engineering in plants: Mechanism of T-DNA transfer – <i>Agrobacterium</i> mediated gene transfer – selectable markers – marker assisted gene transfer.  | <b>13</b> |
| <b>Unit V</b>   | Production of transgenic plants – disease resistant ( <i>Bt</i> cotton) – herbicide resistant (round up soya) – golden rice – <i>Flavr savr</i> tomato – Transgenic plants as bioreactors –Edible vaccines - Plantibodies – Intellectual Property Rights (IPR) - <b>*patenting.</b> | <b>13</b> |

*\*Self study topics*

|   |
|---|
| Powerpoint presentations, Group discussion, Seminar, Assignment |
|---|

#### Text Books:

1. Chawla H.S., 2000. Introduction to Plant Biotechnology, Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
2. Ramawat K.G., 2001. Plant Biotechnology, S. Chand & Company Ltd, New Delhi.
3. Satyanarayana U., 2005. Biotechnology. Books and Allied (P) Ltd., Kolkata.

#### Reference Books:

4. Street H.E., 1977. Plant tissue culture, Blackwell Scientific Publications, London.
5. Trigiano R.N. and Gray D.J., 1996. Plant tissue culture – concepts and laboratory exercises. CRC Press, New york.
6. Ignacimuthu S., 1996. Applied Plant Biotechnology, TataMcGraw Hill Publishing Company Ltd, New Delhi.

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | M    | H    | H    | H    | M    |
| <b>CO2</b> | M    | H    | M    | M    | H    |
| <b>CO3</b> | M    | L    | H    | M    | M    |
| <b>CO4</b> | M    | H    | H    | H    | H    |

S-Strong; H-High; M-Medium; L-Low

| <b>Compiled by<br/>Name with Signature</b> | <b>Verified by HOD Name<br/>with Signature</b> | <b>CDC</b>     | <b>COE</b> |
|--|--|----------------|------------|
| Dr. K. Rajalakshmi                         | Dr.R.Kannan                                    | Dr.M.Durairaju |            |
|  |  |                |            |
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|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                                    | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY615</b> | <b>Course Title</b>                                       | <b>2018-2021</b>                    |
|                       |                 | <b>ELECTIVE – II – BIOINFORMATICS &amp; CYBERSECURITY</b> | <b>Semester 6</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |   | <b>Credits 5</b>                    |

#### **Course Objective**

- To introduce classical bioinformatics theory to students
- To focus computer science techniques used in biological studies

#### **Course Outcome**

|    |     |   |
|----|-----|---|
| K1 | CO1 | To introduce the biological databases and computer languages    |
| K2 | CO2 | To understand the sequence analysis techniques                  |
| K3 | CO3 | To analyse the structure of proteins with the help of computers |
| K4 | CO4 | To know-how upload the DNA sequences on NBIA                    |

|    |     |   |
|----|-----|---|
| K5 | CO5 | To know the role of information security and authentication |
|----|-----|---|

| Unit            | Content  | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | Bioinformatics - definition - biological database (generalized & specialized) - nucleic acid database - protein database - genome database - bibliographic resources and literature database - bioinformatics servers - Computer languages for bioinformatics - HTML – structure – tags – formatting – hyperlink – graphics; C language –* <b>history</b> – features of C – structure of C program.  | <b>13</b> |
| <b>Unit II</b>  | Searching techniques – ENTREZ - sequence analysis tools - sequence alignment - pairwise alignment (BLAST) – multiple sequence alignment (CLUSTAL X) - phylogenetic analysis – tree building and tree analysis.   | <b>13</b> |
| <b>Unit III</b> | Protein prediction - primary structure prediction - secondary structure prediction – bio molecular visualization (RASMOL) – drug discovery - target and lead discovery - Computer Aided Drug designing (CAD).  | <b>13</b> |
| <b>Unit IV</b>  | Introduction to computers - Information security - components of communications system – transmission media – protocol definition – Introduction to TCP/IP – wireless network –* <b>Basics of Internet:</b> types of attack : phishing, spoofing, impersonation, dumpster diving – information Security goals – information security threats and vulnerability: spoofing identity - tampering with data – repudiation - information disclosure - denial of service - elevation of privilege. | <b>13</b> |
| <b>Unit V</b>   | Authentication - password management - E-commerce security - windows security - network security: network intrusion detection and prevention systems - firewalls - software security - web security: user authentication - authentication-secret and session management - cross site scripting - cross site forgery - SQL injection - computer forensics - steganography.  | <b>13</b> |

*\*Self study topics*

|  |
|--|
| Powerpoint presentation, Seminar, Assignment |
|--|

#### **Text Books:**

1. Lesk A.M., 2002, Introduction to Bioinformatics, Oxford University Press, Oxford.
2. Parthasarathy S., 2008. Essentials of programming in C for life sciences. Ane Books India, New Delhi.
3. Sundararajan S. and R. Balaji, 2002 Introduction to Bioinformatics, Himalaya Publishing House – Mumbai.

#### **Reference Books:**

4. Chakraborty C., 2004, Bioinformatics Approaches and Application. Chawla offset printers – Delhi.
5. Westhead D.R., J. Parish and R.M.Twyman, 2003. Bioinformatics (instant notes) Viva books private limited – New Delhi.
6. Khan I.A. and A. Khanum, 2002, Emerging trends in Bioinformatics, Ukaaz Publications.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | M    | H    | M    | M    | H    |
| CO2      | H    | H    | M    | M    | H    |
| CO3      | H    | H    | M    | H    | H    |
| CO4      | M    | H    | H    | H    | H    |
| CO5      | L    | M    | H    | L    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr.R.Kannan                        | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
|                                    |  |                |     |

|                       |                 |   |                                     |
|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY616</b> | <b>Course Title</b>                     | <b>2018-2021</b>                    |
|                       |                 | <b>ELECTIVE – III – HABITAT ECOLOGY</b> | <b>Semester 6</b>                   |
| <b>Hrs/Week</b>       | <b>5</b>        |   | <b>Credits 5</b>                    |

#### Course Objective

- To know the uniqueness of the varying habitats in the biosphere
- To acquire the knowledge about the structure and functions of different ecosystems
- To learn the techniques for environmental assessment and ecological dynamics.

#### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To appreciate the various habitats and their vegetation                  |
| K2 | CO2 | To understand the concept of habitats and succession                     |
| K3 | CO3 | To analyse the components of different ecosystems                        |
| K4 | CO4 | To know-how the methods of Environmental audits and Environmental Impact |



|    |     |   |
|----|-----|---|
|    |     | Assessment  |
| K5 | CO5 | To inventor and manage the natural resources using Remote sensing techniques. |

| Unit            | Content  | Hrs       |
|-----------------|--|-----------|
| <b>Unit I</b>   | Introduction to habitat ecology: historical, ecological & evolutionary perspectives - habitat concepts (edge, ecotones, interspersion and juxtaposition) - units of vegetation – <b>*succession.</b>   | <b>13</b> |
| <b>Unit II</b>  | Ecology of major habitats: forest (tropical rain forest, deciduous and coniferous) – scrub jungle and deserts (hot, dry and cold deserts) – grasslands (temperate and tropical).   | <b>13</b> |
| <b>Unit III</b> | Ecology of major habitats: aquatic (fresh water - lentic & lotic) – marine (coasts, estuaries, phytoplankton and phytobenthos, mangroves and coral reefs.) – tundra (arctic and alpine).   | <b>13</b> |
| <b>Unit IV</b>  | Physical and anthropogenic factors influencing habitats - habitat degradation and fragmentation - Environmental Impact Assessment (EIA) - environmental audits - <b>*Environmental Legislations and Regulations.</b>   | <b>13</b> |
| <b>Unit V</b>   | Inventory of unique habitats and their distribution - Remote Sensing (RS) - Geographical Information System (GIS) –Indian Regional Navigation Satellite System (IRNSS)- principles and applications of remote sensing techniques - cover classification and mapping - use and values of GIS approaches to habitat ecology. | <b>13</b> |

*\*Self study topics*

|  |
|--|
| Field study, Inventory of Campus vegetation, Powerpoint presentations, Seminar, Assignment |
|--|

#### **Text Books:**

1. Odum E.P.(ed), 1971. Fundamentals of Ecology, W.B. Saunders Company, Philadelphia.
2. Sharma P.D., 1997. Ecology and Environment, Rastogi Publications, Meerut.
3. Dash M.C., 1993. Fundamentals of Ecology, Tata McGraw Hill, New Delhi.
4. Agarwal K.C., 1989. Environmental Biology, Agro Botanical Publishers (India), Delhi.
5. Ananthkrishnan T.N., 1987. Bioresources Ecology, Oxford and IBH, New Delhi.
6. Kormondy E.J., 1999. Concepts of Ecology, Prentice Hall, New Delhi.

#### **Reference Books:**

7. Leonard Ortolano, 1997. Environmental Regulation and impact Assessment. John Wiley & Sons, Inc.
8. Cadogan A. and G. Best, 1992. Environment and Ecology, Nelson Blackie, Glasgow.
9. Lenihan J. and W.W. Fletcher, 1977. Environment and Man, Vol IV. The Chemical Environment, Blackie, London.

10. Pandian T.J., 2000. Biodiversity: Status and Endeavours of India, UNESCO sponsored international workshop on Biodiversity, Ghent University, Belgium, pp. 3-6
11. Subrahmanyam N.S., and Sambamurthy, A.V.S., 2001. Ecology, Narosa Publishing House, New Delhi.

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | H    | H    | M    | H    | H    |
| CO2      | M    | H    | M    | L    | M    |
| CO3      | H    | H    | S    | M    | M    |
| CO4      | M    | M    | H    | L    | S    |
| CO5      | S    | H    | S    | S    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr.R.Kannan                        | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |
|                                    |  |                |     |

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|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                                 | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY617</b> | <b>Course Title</b>                                    | <b>2018-2021</b>                    |
|                       |                 | <b>MAJOR PRACTICAL - III (for V sem theory papers)</b> | <b>Semester 6</b>                   |
| <b>Hrs/Week</b>       | <b>2</b>        |  | <b>Credits 4</b>                    |

#### Course Objective

- To learn the plant systematics and herbarium techniques
- To study the physiological processes in the plant system
- To acquire practical knowledge on plant tissue culture and genetic engineering

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To appreciate the diversity of flowering plants and their identification in their natural habit |
| K2 | CO2 | To get hands-on training in culturing bacteria  |

|    |     |  |
|----|-----|--|
| K3 | CO3 | To identify economically important plant diseases                          |
| K4 | CO4 | To solve biological problems using mathematics                             |
| K5 | CO5 | To create interest in learning the applications of Genetic Engineering     |
| K6 | CO6 | To obtain working knowledge in creating a word document, powerpoint, excel |

| Unit            | Content   | Hrs      |
|-----------------|---|----------|
| <b>Unit I</b>   | <p><b>Taxonomy of Angiosperms</b><br/>Detailed study, description of floral parts of the plant families included in theory paper. Field trip, collection of plants and submission of herbarium 20 sheets.</p> <p><b>Genetics:</b><br/>Solving problems on Mendelian inheritance and interaction of genes; charts and diagrams from genetics.</p>  | <b>6</b> |
| <b>Unit II</b>  | <p><b>Microbiology:</b><br/><b>Demonstrations:</b></p> <ol style="list-style-type: none"> <li>1. Microscopy</li> <li>2. Culture media preparation</li> <li>3. Pure culture techniques (streak, pour and spread plate)</li> <li>4. Antibiotic assay</li> </ol> <p><b>Individual experiments</b></p> <ol style="list-style-type: none"> <li>1. Smear preparation</li> <li>2. Simple staining</li> <li>3. Differential staining</li> <li>4. Hanging drop experiment</li> </ol> <p><b>Charts:</b> Ultra structure of bacterium, HIV, rabies, T<sub>4</sub> phage, antigen and antibody and food and industrial microbiology related charts.</p> <p><b>Plant pathology</b><br/>Specimens/charts/ of diseases:</p> <ol style="list-style-type: none"> <li>1. Citrus canker</li> <li>2. Red rot of sugar cane</li> <li>3. Tikka disease of ground nut</li> <li>4. Paddy blast</li> <li>5. TMV</li> </ol> | <b>5</b> |
| <b>Unit III</b> | <p><b>Genetic Engineering:</b><br/>Charts/spotters on Genetic Engineering</p>   | <b>5</b> |
| <b>Unit IV</b>  | <p><b>Mathematics for Biologists:</b> Simple problems on</p> <ol style="list-style-type: none"> <li>1. manipulating numbers</li> <li>2. units and conversion</li> <li>3. molarities and dilutions</li> <li>4. areas and volumes</li> <li>5. exponents and logs</li> <li>6. matrices and determinants.</li> </ol> <p><b>Bio- Statistics:</b></p> <ol style="list-style-type: none"> <li>1. Collection, analysis and graphical representation of data</li> <li>2. measures of central tendency - mean, median and mode</li> <li>3. measures of dispersion: range, standard deviation, coefficient of variation correlation</li> <li>4. Test of significance - Chi-square test and Student 't' test.</li> </ol>  | <b>5</b> |

|               |   |          |
|---------------|---|----------|
| <b>Unit V</b> | <b>Application of software in Biostatistics:</b><br>1. Simple exercises in MS- Word<br>2. Presentation in MS-Powerpoint<br>3. Statistical calculations and chart preparation in MS-Excel<br>4. Creation of database in MS-Access. | <b>5</b> |
|---------------|---|----------|

Identification of plants, Demonstrations, culture techniques

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | S    | M    | H    | H    | H    |
| <b>CO2</b> | M    | M    | H    | M    | H    |
| <b>CO3</b> | H    | M    | H    | M    | M    |
| <b>CO4</b> | H    | M    | H    | L    | S    |
| <b>CO5</b> | M    | M    | M    | M    | S    |
| <b>CO6</b> | H    | M    | H    | L    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. M. Latha Isabel                | Dr.R.Kannan                            | Dr.M.Durairaju |     |
| Dr. A. Logamadevi                  |  |                |     |
|                                    |  |                |     |

| Programme Code | B.Sc.,   | Programme Title                                 | Bachelor of Science (BOTANY) |
|----------------|----------|---|------------------------------|
| Course code    | 18UBY618 | Course Title                                    | 2018-2021                    |
|                |          | MAJOR PRACTICAL - IV (for VI sem theory papers) | Semester 6                   |
| Hrs/Week       | 2        |   | Credits 4                    |

#### Course Objective

- To acquire basic knowledge in mathematics & biostatistics
- To create programs for bioinformatics
- To understand bioinformatics tools

#### Course Outcome

|    |     |   |
|----|-----|---|
| K1 | CO1 | To compare the physiological functions of plants under different environmental conditions |
| K2 | CO2 | To know the economically important plants and their produces                              |

|    |     |  |
|----|-----|--|
| K3 | CO3 | To create interest in rearing plants <i>in vitro</i>               |
| K4 | CO4 | To learn the bioinformatics tools to analyse the protein structure |
| K5 | CO5 | To study the vegetation using Quadrat and line transect method     |

| Unit            | Content   | Hrs      |
|-----------------|---|----------|
| <b>Unit I</b>   | <b>Plant physiology</b><br><b>Individual experiments:</b> <ol style="list-style-type: none"> <li>1. Estimation of water potential (DPD) by liquid immersion method and plasmolytic method.</li> <li>2. Estimation of osmotic pressure by plasmolysis.</li> <li>3. Determination of respiration by respiroscope</li> <li>4. Determination of stomatal frequency and index.</li> <li>5. Determination of rate of transpiration - Cobalt chloride, Ganongs potometer.</li> <li>6. Determination of rate of photosynthesis under different CO<sub>2</sub> concentrations &amp; different light intensities using wilmots bubbler</li> </ol> | <b>6</b> |
| <b>Unit II</b>  | <b>Plant physiology demonstration experiments:</b> <ol style="list-style-type: none"> <li>1. Light screen experiment</li> <li>2. Soil nitrification</li> <li>3. Determination of respiratory quotient</li> <li>4. Essentiality of mineral elements on plant growth – Hydroponics</li> </ol> <b>Economic &amp; Ethno Botany</b><br>Economic importance of fibre yielding plants, oil yielding plants, pulses, cereals, spices and condiments.  | <b>5</b> |
| <b>Unit III</b> | <b>Plant Biotechnology</b><br>Charts/spotters on Plant biotechnology and transgenic plants<br>Demonstration <ol style="list-style-type: none"> <li>1. Media for plant tissue culture</li> <li>2. Callus induction</li> <li>3. Regeneration of plantlet</li> <li>4. Synthetic seeds</li> </ol>   | <b>5</b> |
| <b>Unit IV</b>  | <b>Bioinformatics</b> <ol style="list-style-type: none"> <li>1. Programming using HTML</li> <li>2. Designing and editing of web page,               <ol style="list-style-type: none"> <li>1. Writing programs using C.</li> <li>2. Searching and retrieval of biological database.</li> <li>3. Bibliographic searching using ENTREZ</li> <li>4. Sequence alignment</li> <li>5. Gene finding</li> <li>6. Protein prediction</li> <li>7. Molecular visualization</li> </ol> </li> </ol>  | <b>5</b> |
| <b>Unit V</b>   | <b>Habitat Ecology</b> <ol style="list-style-type: none"> <li>1. Vegetation study by Quadrat and Line transect method</li> <li>2. Estimation of plant biomass</li> <li>3. Determination of dissolved oxygen</li> <li>4. Estimation of CO<sub>2</sub> in selected water samples</li> <li>5. Determination of Total Dissolved Solids</li> </ol>   | <b>5</b> |

|  |  |  |
|--|--|--|
|  | 6. Spotters and charts on Habitat ecology. |  |
|--|--|--|

| CO \ PSO | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|----------|------|------|------|------|------|
| CO1      | M    | M    | H    | M    | M    |
| CO2      | M    | M    | M    | H    | M    |
| CO3      | M    | M    | H    | M    | M    |
| CO4      | M    | M    | M    | S    | H    |
| CO5      | S    | H    | S    | H    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. R. Kannan                      | Dr. R. Kannan                          | Dr.M.Durairaju |     |
| Dr. M. Latha Isabel                |  |                |     |

|                       |                 |   |                                     |
|-----------------------|-----------------|---|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>  | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY6S3</b> | <b>Course Title</b>   | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (MAJOR) – HORTICULTURE AND PLANT BREEDING</b> | <b>Semester 6</b>                   |
| <b>Hr/Week</b>        | <b>1</b>        |   | <b>Credits 2</b>                    |

#### Course Objective

- To study the basic principles of horticulture
- To learn the techniques of plant propagation
- To know the methods and practices in plant breeding

#### Course Outcome

|    |     |  |
|----|-----|--|
| K1 | CO1 | To revisit the methods of vegetative propagation     |
| K2 | CO2 | To understand the principle behind plant propagation |

|    |     |  |
|----|-----|--|
| K3 | CO3 | To propagate plants using simple horticultural techniques                    |
| K4 | CO4 | To develop interest in flower arrangement, fruit preservation and vegetables |

| Unit            | Content  | Hrs      |
|-----------------|--|----------|
| <b>Unit I</b>   | Scope – methods of vegetative propagation – cutting – layering – grafting – manures – fertilizers – irrigation.  | <b>3</b> |
| <b>Unit II</b>  | Gardening – important ornamentals – habits and types – types of garden – Terrace garden – public garden – garden components – lawn – glass house – rockery – water garden - topiary. | <b>3</b> |
| <b>Unit III</b> | Production technology – plant protection measures for horticultural crops – cultivation of vegetables (Brinjal) – flowers (Jasmine)  | <b>2</b> |
| <b>Unit IV</b>  | Commercial horticulture – papain – bonsai – flower arrangement – cut flowers – preservation of fruits and vegetables.  | <b>2</b> |
| <b>Unit V</b>   | Plant breeding – objectives – plant selection – plant introduction – hybridization – achievements in crop breeding – Paddy.  | <b>2</b> |

Charts, Powerpoint presentation, Demonstration

#### Text Books:

1. Mani BhusanRao, 1964. Text book of Horticulture. Macmillan India Ltd., Newdelhi.
2. Sharon Pastor *et al.*, 2010. Basics of Horticulture, Oxford Book Company, Jaipur.
3. Singh P., 1996. Plant Breeding. Kalyani publishers, NewDelhi.

#### Reference Books:

4. Kumar N., 1993. An introduction to horticulture, TNAU, Coimbatore.
5. George Acquaaah, 2004. Horticulture – principles and practices. Prentice Hall of India Pvt Ltd., New Delhi.
6. Edmond, 1988. Fundamentals of Horticulture. MCGH Publications New Delhi.
7. Shukla R.S. and P.S. Chandal, 1998. Cytogenetics Evolution and Plant Breeding. Chand & Company Ltd. NewDelhi.
8. Satya P. 2012. Plant Breeding. Books and allied Pvt Ltd. Kolkatta.

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | S    | L    | M    | S    | M    |
| <b>CO2</b> | M    | H    | H    | M    | M    |
| <b>CO3</b> | M    | H    | S    | M    | M    |
| <b>CO4</b> | H    | M    | S    | S    | S    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. M. Latha Isabel                | Dr.R.Kannan                            | Dr.M.Durairaju |     |

|                       |                 |  |                                     |
|-----------------------|-----------------|--|-------------------------------------|
| <b>Programme Code</b> | <b>B.Sc.,</b>   | <b>Programme Title</b>                           | <b>Bachelor of Science (BOTANY)</b> |
| <b>Course code</b>    | <b>18UBY6S4</b> | <b>Course Title</b>                              | <b>2018-2021</b>                    |
|                       |                 | <b>SKILL BASED ELECTIVE (MAJOR) – BIOFARMING</b> | <b>Semester 6</b>                   |
| <b>Hr/Week</b>        | <b>1</b>        |  | <b>Credits 2</b>                    |

#### **Course Objective**

- To learn the concept and simple techniques in organic farming

#### **Course Outcome**

|    |     |   |
|----|-----|---|
| K1 | CO1 | To list down the merits of Biofarming over conventional farming     |
| K2 | CO2 | To learn the preparation of various organic manures and panchakavya |
| K3 | CO3 | To analyse the water and weed management practises                  |



|    |     |  |
|----|-----|--|
| K4 | CO4 | To prepare herbal pest repellents                              |
| K5 | CO5 | To market the organic crops and certification of organic crops |

| Unit            | Content  | Hrs      |
|-----------------|--|----------|
| <b>Unit I</b>   | Biofarming – organic farming – introduction – concept – conventional Vs organic farming  | <b>3</b> |
| <b>Unit II</b>  | Organic manuring – farmyard manure – green manure – <i>panchakavya</i> - fish tonic – horn manure – composting – vermicomposting- Em4.                 | <b>3</b> |
| <b>Unit III</b> | Water and weed management practices – mulching – dry mulching, green mulching, live mulching – stone mulching.   | <b>2</b> |
| <b>Unit IV</b>  | Integrated plant protection management – biofence – companion plants – herbal pest repellants- neem formulations – bacterial and fungal biopesticides. | <b>2</b> |
| <b>Unit V</b>   | Organic crops certification – requirements – soil testing - procedure – validity – labeling- organic crops marketing.                                  | <b>2</b> |

Powerpoint presentation, Demonstration, Success story - Discussion

#### Text books:

1. PawarR.K., 2009. Organic farming for Sustainable Horticulture. Oxford Book Company, India.
2. Arun K. Sharma, 2004. Biofertilizers for Sustainable Agriculture. Agrobios India Ltd, Jodhpur.

#### Reference Books:

3. Arun K. Sharma, 2004. A Handbook of Organic farming. Agrobios India Ltd, Jodhpur.
4. DahamaA.K., 2009. Organic farming for Sustainable Agriculture. Agrobios India Ltd, Jodhpur

| CO \ PSO   | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
|------------|------|------|------|------|------|
| <b>CO1</b> | M    | H    | M    | M    | M    |
| <b>CO2</b> | M    | M    | S    | M    | H    |
| <b>CO3</b> | M    | M    | S    | M    | H    |
| <b>CO4</b> | M    | M    | S    | M    | H    |
| <b>CO5</b> | H    | H    | M    | M    | H    |

S-Strong; H-High; M-Medium; L-Low

| Compiled by<br>Name with Signature | Verified by HOD Name<br>with Signature | CDC            | COE |
|------------------------------------|--|----------------|-----|
| Dr. K. Rajalakshmi                 | Dr.R.Kannan                            | Dr.M.Durairaju |     |
|                                    |  |                |     |

