

# ST. XAVIER'S COLLEGE (AUTONOMOUS)

Palayamkottai - 627 002

(Recognized as "College with Potential for Excellence" by UGC)

(Re-accredited with "A" Grade with a CGPA of 3.50)



## SYLLABUS

***Preserve this copy of the syllabus until you complete the course, as it is an important document of your present course of study.***

Name \_\_\_\_\_

**M.Phil. BOTANY**  
**(w.e.f. 2018 - 19)**

PROGRAMME NAME :M.PHIL BOTANY

PROGRAMME CODE: MBO

PROGRAMME SPECIFIC OUTCOMES

M.Phil Botany student should have: Acquired the knowledge with facts and figures related to various subjects in plant sciences. Understood the basic concepts, fundamental principles, and the scientific theories related to various botanica phenomena and their relevancies in the day-to-day life. Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments The skills of observations and drawing logical inferences from the scientific experiments The skills of observation and drawing logical inferences from the scientific experiments. Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions. Been able to think creatively (divergently and convergent) to problems. Realized how developments in plant science subject helps in the development of other science subject and vice-versa and how developments in plant science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments. Developed scientific outlook not only with respect to science subjects but also in all aspects related to life. Realized that knowledge of subjects in other faculties such as humanities, performing arts, social sciences etc. can have greatly and effectively influence which inspires in evolving new scientific theories and inventions. Imbibed ethical, moral and social values in personal and social life leading to highly culture and civilized personality. Developed various communication skills such as reading, listening, speaking, etc., which will help in expressing ideas and views clearly and effectively. Realized that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life.

DEPARTMENT OF BOTANY

ST. XAVIER'S COLLEGE (AUTONOMOUS)

M.Phil. BOTANY

Course pattern (From June 2018)

Sem	Title	Sub. Code	No.of Hrs	Lib	Seminar	Hrs	Credits
I	Research Methodology	18MBO11	6	6	3	15	4
	Advanced Plant Physiology	18MBO12	6	6	3	15	4
II	Project oriented elective course	18MBO21	6	2	2	10	4
	Dissertation & Viva voce	18MBO22	15	4	1	20	12
Total						60	24

Project oriented elective course.

1. Ethnobotany
2. Pharmacognosy
3. Bioprospecting
4. Marine Botany
5. Applied Botany
6. Stress Physiology
7. Bioinformatics
8. Plant Molecular Biology
9. Biostatistics
10. Nanobiotechnology
11. Conservation Biology

## RESEARCH METHODOLOGY

(SUB CODE 18MBO11)

Semester: I

Paper: 1

Hours: 6

Credits: 5

### OUTCOME

- The importance of research for the development of science and the welfare of the human race will be ingrained in the minds of the students
- The students will learn and have hands on experience of the various methods of doing scientific research
- Students will learn the modern techniques in plant science.

### UNIT : I

Research techniques: meaning and objectives, methods and approaches in research Literature and reference collection. Role of libraries in research, virtual libraries. Internet World Wide Web-search engines and browsing tools-e journals and e books – Manuscript processing – citation and proof correction – thesis and journal format. Preparation and publication of a scientific paper, submission. Credit rating of journals- regional and international journals – online journals. Bibliometrics databases, h-index, Page Rank, Impact factor and evaluation. The use of bibliometrics in research: Citation Research, Science Citation Index

### UNIT: II

Microscopic techniques: Properties of electromagnetic radiation and its interaction with matter. Light microscopy – Bright field, Dark field, Phase contrast and Fluorescent. Calibration and microscopic measurements. Microtechnique and preparation of permanent slide. Electron microscopy – principle and applications of TEM and SEM. Preparation of materials for EM Photomicrography and digital photomicrography and digital photomicrography.

### UNIT: III

Analytical methods:

Spectroscopic techniques: UV and – IR, NMR and AAS.

Electrochemical techniques: Principles – PH, measurement of pH and preparation of biological buffers. Oxygen electrode. Electrochemical detectors for HPLC.

Radioisotope techniques measurement of radioactivity, atomic stability and radiation types of radioactive decay. Rate of radioactive decay – units of radioactivity. Detection and measurement of radioactivity – GM counter and Scintillation counter labeling of biological molecules and autoradiography – application of

## UNIT: IV

### **Separation methods:**

Centrifugation – principle and types, preparative and general purpose centrifuges, high speed ultracentrifuges-analytical ultracentrifuges.

Chromatographic methods: principle of Paper, Thin layer and Column chromatography, Application of different principles in different types of chromatographic methods. GC, GLC and HPLC.

Electrophoretic techniques: Principles and construction of vertical and horizontal electrophoresis – supporting media preparation (gels for proteins and nucleic acids).

Buffers and electrolytic separation-detection and estimation of electrophorograms by transilluminations and gel doc. Molecular techniques – Non – PCR based – RELP, PCT, Inverse PCR, RT – PCT, RAPD, AFLP, SSR and blotting techniques.

## UNIT:V

Statistical Methods-Population and sampling, data collection, data analysis and graphical representation, Measures of central tendency (arithmetic mean, median, and mode). Measures of dispersion S.D., Correlation and regression analysis. Probability – terminologies. Normal and binomial distribution. Statistical testing F test. T-test and chi-square test. Experimental designs. ANOVA –One way and two way analysis-analysis of statistical softwares – M.S Excel, SPSS.

### REFERENCES:

1. Bryan C Williams and Keith Wilson. 1983. A biologist's guide to practical techniques of practical biochemistry second edition. Edward Arnold Publications.
2. K.Anbalagan – Electrophoresis.
3. David Plummer. 1987 An introduction to Practical Biochemistry. Tata McGraw Hill
4. Metcalfe (Ed.). Atomic Absorption and emission spectroscopy. John Wiley and Sons.
5. Jayaraman, J. Laboratory manual in Biochemistry, Wiley Eastern Ltd:
6. Johansen, M. 1940. Plant Microtechnique, McGraw Hill.
7. Stock, R and Rice, C.B.F. 1980. Chromatographic methods. Chapman and Hall
8. Keith Wilson and John Walker. 1997. Practical biochemistry IV edition, Cambridge Universities Press.
9. George Casella and Roger L. Berger. 2003. Statistical inference second edition. Duxbury Advanced series, Thomson press.
10. Sunder Rao. P.S.S and Richard, J. An introduction to Biostatistics, Prentice Hall International.

## ADVANCED PLANT PHYSIOLOGY

(SUB CODE 18MBO 12)

SEMESTER : I

HOURS:6

PAPER: 2

CREDITS: 5

### OUTCOME

The various mechanisms by which plants regulate their metabolism will be learnt

The importance of light and photosynthesis in the life of plants will be understood

The various life processes of plants will be understood

### UNIT:I

Transport and translocation of water and minerals:

Water relation of the plant cell-components of water potential – Mechanism of Absorption and transport of water – The structure and function of xylem – Stomatal Movement – Mineral nutrients, ions-Mechanism of absorption and transport of ions across the membrane.

### UNIT: II

Metabolism: Photosynthesis – light reactions – Organization of photosyn-thetic apparatus – Proton transport and ATP synthesis in chloroplast. Carbon reactions: C3 and C4 cycles, CAM photosynthesis and photorespiration. Physiological and ecological consideration of photosynthesis: Translocation in the Phloem.

Respiration: Glycolysis, Krebs's cycle, Electron transport and ATP synthesis in Mitochondria – Cyanide resistant respiration.

### UNIT:III

Metabolisms: Nitrogen metabolism-source of nitrogen-Nitrate assimilation and Ammonium assimilation-Biological Nitrogen Fixation-Assimilation of mineral. Secondary metabolism and plant defences secondary metabolites – (Terpenes, Phenolic compounds and Nitrogen containing compounds)-Plant defense against insects and pathogens.

### UNIT: IV

Growth and Development:

Growth and development – Role of phytochrome and light control on plant development. Hormones: Auxin, Absciscic acid, gibberellins, ethylene, cytokinins, brassinosteroids. Gene expression and signal transduction.

### UNIT: V

Terminologies related to stress physiology – physiological impact and plants responses of water stress-heat stress and salinity stress-physiological perspectives of Tissue culture – Genetic engineering for crop improvement.

#### REFERENCES:

1. Bidwell R.G.S. 1979. Plant physiology, Macmillan publishing Company, New York.
2. Devlin R.M. 1974. Plant Physiology, Affiliated east Press Pvt. Ltd.
3. Hess, D. Plant Physiology, Narosa publishing House, New Delhi.
4. Kramer P.J. 1969. Plant & Soil water relationship.
5. Noggle, G.R., & Fritz, G.J. 1976. Introductory plant physiology, Prentice Hall India, New Delhi.
6. Salisbury, F.B., & Ross, S. 1974. Plant Physiology, Prentice – Hall India, New Delhi.
7. Taiz, L. & Zeiger, E. 1998. Plant Physiology, Sinauer Associates, Inc., Publishers, Massachusetts. United States of America.
8. Lawlor, D.W., 2001. Photosynthesis 3<sup>rd</sup> Ed, Viva Books Pvt., Ltd, Chennai.

SPECIAL PAPER  
(SUBCODE 18MBO21)

Semester : II

Paper:3

Hours:6

Credits:5

DISSERTATION AND VIVA VOCE  
(SUB CODE 18MBO22)

SEMESTER:II

HOURS:15

CREDITS:5