

**MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL**  
**ALLOCATION OF PAPERS AND CREDITS (SEMESTER-WISE) FOR M.Phil**  
**BOTANY PROGRAMME AS PER THE TANSICHE RULES 2018-19 ONWARDS**

**M.Phil Botany Course Structure under Choice Based Credit System (CBCS)**

P. No .	Paper Code	Course Title	Hours	Credits	Continuous Internal Assessment (CIS)	End Semester Exam (ESE)	Total
<b>Semester I</b>							
1.	ABOT11	Core I (Theory)- Research Methodology	6	4	40	60	100
2.	ABOT12	Core II (Theory)- Advances in Botany	6	4	40	60	100
3.	ABOT13	Core III (Theory)- Professional Skills	6	4	40	60	100
		<b>Total</b>		<b>12</b>			<b>300</b>
<b>Semester II</b>							
4.	ABOT24	Core IV (Theory)- Guide Paper	6	4	40	60	100
5.	ABOP21	Dissertation + Viva-voce	6	14(12+2)	-	-	200
		<b>Total</b>		<b>18</b>			<b>300</b>
		<b>Total</b>	<b>30</b>	<b>30</b>			<b>600</b>

**For each course other than Dissertation**

Continuous Internal Assessment (CIA)	- 40 Marks
End Semester Examination (ESE)	- 60 Marks
Total	- 100 Marks

**SEMESTER I**  
**CORE I (THEORY)-RESEARCH METHODOLOGY - ABOT11**

**Credits :4**

**Hours :6**

**Objectives**

- To develop understanding of the basic instruments for biological research & various research designs and techniques.
- To identify various sources of information for literature review and data collection.
- To develop an understanding of an overview to the fields of bioinformatics.
- To acquire knowledge in the application of research theory and methods, and develop skills required in writing research proposals, reports, and dissertation

**CORE I (THEORY)-RESEARCH METHODOLOGY – ABOT11**

**UNIT- 1**

Formulating research problem, Conceptual research design, Constructing an instrument for data collection, Selecting a sample, Writing a research proposal, Collecting data, Processing data, Displaying data, Writing a research report.

**UNIT- II**

Microscopy - Differential interference contrast (DIC), polarization, fluorescent Microscopy, dark field and phase contrast microscopy. Electron microscope- SEM and TEM. Atomic Force Microscopy. field emission scanning electron microscope , XRD, scanning Spectroscopy- Principles- FTIR, Atomic Absorption Spectroscopy, NMR,MALDI- TOFI, Electrophoresis: Principle -Polyacrylamide gel electrophoresis (PAGE & SDS PAGE) .

**UNIT- III**

Chromatography: Principle- TLC, GC, GLC, HPLC and HPTLC. Nucleic acids – Isolation and purification. Southern, Western and Northern hybridization techniques, Colony hybridization. Polymerase Chain Reaction, Genome mapping, Molecular markers – RFLP, RAPD, AFLP.

#### **UNIT- IV**

Biostatistics: Measures of Central Tendency: standard deviation and standard error. Correlation and Regression: Correlation coefficient – Types of correlation – Regression- Simple and Linear regression– Tests of significance – Student's 't' test – Chi-square test – Analysis of variance –One way- Two way.

#### **UNIT- V**

Bioinformatics: Electronic biological data bases – NCBI, PubMed, Sequence and Structure data bases. ORF, BLAST-N, BLAST- P, Dendrogram tree construction, Multiple sequence alignment for gene isolation from EST, FASTA format for sequence submission to Gene Bank.

#### **REFERENCES:**

1. Batschelet, E. 1991. Introduction to Mathematics for Life Scientists. Springer International Student Edn., Narosa Publishing House, New Delhi.
2. Becker, J.M., Caldwell, G.A. and Zachgo, E.A. 1996. Biotechnology: A Laboratory Course, 2nd Edn. Academic Press, Inc., San Diego, California.
3. Cannel, J.P. 1998. Natural Products Isolation. Humana Press, New Jersey, USA.
4. Chirikjian, J.G. 1995. Biotechnology: Theory and Techniques Vol. I. Plant Biotechnology, Animal Cell Culture, Immunobiotechnology. Jones and Bartlett Publishers, London, England.
5. Cynthia Gibas and Per Jambek. 2001. Developing Bioinformatics computer skills, Shroff Pub., Mumbai.
6. Forthofer, L. 1995. Introduction to Biostatistics, Academic Press, New York.
7. Gupta, S.C. and Kapoor, V.K. 2002. Fundamentals of Mathematical Statistics, (11th Edn.). Sultan Chand & Sons, New Delhi.
8. Harborne, J.B. 1998. Phytochemical Methods. Chapman & Hall, London.

9. Jordan, D.W. and Smith, P. 2002. *Mathematical Techniques*. Oxford University Press, New Delhi.
10. Primrose, et al. 2005. *Principles of gene manipulation*. Black Well Science, London.
11. Sambrook and Russel. 2001. *Molecular cloning-A laboratory manual*. Cold Spring Laboratory Press, New York.
12. Sharma, B.K 1996. *Instrumental Methods of Chemical Analysis*. Goel Publishing House, Meerut.
13. Sokal, R. R. and Rohlf, F.J. 1987. *Introduction to Biostatistics (Biology-Statistics Series)*. W.H. Freeman & Company, New York.

## **CORE II (THEORY)- ADVANCES IN BOTANY - ABOT12**

**Credits: 4**

**Hours: 6**

### **Objectives**

- Understanding the Plant Systematic and Taxonomy - concepts, importance of taxonomy and need for classification
- Understanding the concepts and importance of Plant Breeding
- Understanding the concepts and principles of Plant Biodiversity: Genetic diversity in plants, Importance of genetic diversity in crop improvement
- Understanding the recent advances in Plant Tissue culture techniques and its task in food production and Transgenic plants for crop improvement

### **UNIT-I**

#### **Plant Systematic and Taxonomy**

**Plant systematic:** The integration of taxonomy (identification, nomenclature, classification emphasizing flowering plants), evolution (speciation, reproductive biology, adaptation, convergence, biogeography), and phylogenetics (phenetics, cladistics, morphology and molecules). Taxonomic tools : Herbarium, floras, Botanical gardens, Computers, GPS, GIS. Systems of Angiosperm Classification : Phenetic versus phylogenetic systems. Cladistics in taxonomy, Angiosperm phylogeny group (APG). Plant Taxonomy: Definitions and concepts, importance of taxonomy and need for classification, hierarchical classification, general and special purpose classifications, Alpha and Omega taxonomy, taxonomy as synthetic discipline.

### **UNIT- II**

**Plant Breeding:** History of Plant Breeding, High yield, improved quality, disease and pest resistance, early maturity, photosensitivity, varieties for new seasons, resistant varieties. Creation

of new varieties, selection, evaluation, multiplication and distribution. Different centers and their significance. Germplasm conservation- in situ seed banks, plant banks, shoot tip banks, cell and organ banks, DNA banks, germplasm evaluation- cataloguing- multiplication and distribution.

### **Unit III**

**Plant BioDiversity:** Genetic diversity in plants, Importance of genetic diversity in crop improvement and its erosion, Concepts of biodiversity conservation and regulation. *In situ* conservation: Sanctuaries, National parks, Biosphere reserves, Mangroves – *Ex situ* conservation: Botanical gardens, Gene banks, Seed Banks, Cryobanks – Activities of IUCN, NBPGR – Applications of molecular markers in Biodiversity. Plant biodiversity databases- molecular docking- IPR,

### **UNIT- IV**

**Plant Tissue culture technology:** Tissue culture techniques - callus culture-suspension culture-culture of single cells- somatic embryogenesis - anther culture- ovary culture- meristem culture, somatic hybridization, Embryo culture- *in vitro* pollination, Micropropagation, Protoplast isolation fusion and culture,Somaclonal variation: Somaclonal and gametoclonal variations and importance. Technique for detection and isolation of somaclonal variants. Factors controlling somaclonal variation and its application in plant breeding, Transformation techniques: Agrobacterium mediated gene transfer.

### **UNIT-V**

**Transgenic Plants:** Transgenic plants for crop improvement (dicots and monocots), Insect resistance, insecticide, Resistance to virus, Transgenics for male sterility, Transgenics for terminator seed, Transgenics plants as bioreactors, Transgenics plants to study regulated gene expression, Commercial transgenics crops, Uses and applications of transgenic plants. Germplasm Storage and Cryopreservation : Conservation of germplasm, *In vitro* strategies, Short, medium and long term (cryopreservation) preservation application, Techniques of cryopreservation, Determination of survival and viability, Plant growth and regeneration, Application of cryopreservation.

**REFERENCES**

1. Lawrence, GHM. (1995). The Taxonomy of vascular Plants (Vol I-IV) ,Central Book, Dept., Allahabad
2. Heywood VH. (1967). Plant Taxonomy , Edward Arnold , London
3. Jeffery C. (1982 ). An introduction to Plant Taxonomy, J& A Churchill Ltd., London
4. Mathew, K.M. (1983). The Flora of Tamil Nadu Carnatic, The Rapinat Herbarium, Trichy.
5. Simpson M.G.(2006). Plant systematics , Elsevier Academic Press,USA
6. Takhtajan, A.L. (1969). Flowering Plants – Origin and dispersal – Oliver & Boyed
7. Takhtajan A. (1991). Evolutionary trends in flowering plants , Bishen Singh Mahendra Pal Singh, Dehra dun
8. Allard R.W 1995. Principles of Plant Breeding. John Wiley and Sons, Inc., Singapore.

## I Semester – Core III (Theory)

### PROFESSIONAL SKILLS (Common Paper)

#### Objectives:

After completing the course, the scholars will be able to

- Develop skills to ICT and apply them in teaching, learning contexts and research.
- Acquire the knowledge of communication skills with special reference to its elements, types, development and styles.
- Understand the terms: Communication technology, Computer Mediated Teaching and develop Multimedia/E-content in their respective subjects.
- Develop different teaching skills for putting the content across to targeted audience.

#### Unit I - Computer Application Skills

Fundamentals of Computers and windows, Operating System – **MS – Office** Components; **Word**: Equation editor, Table Manipulation – Formatting Features – organizational Chart. **MS – EXCEL**: Statistical Functions – Number Manipulation – Chart Preparation with various types of graphs. **MS PowerPoint**: PowerPoint presentation with multimedia features. **Internet and its applications**: E-mail and attachments – working with search engines.

#### Unit II - Communication Skills (English/Tamil/Both)

**English**: Skills of Communication: Listening, Speaking, reading and Writing – Writing Synopsis, Abstract and proposals. Developing good language abilities – Public speaking – Writing Skills.

**Tamil**: பயிற்றுவிக்கும் திறன் - பேச்சுத்திறன் - வெளிப்பாட்டுத் திறன் - ஆய்வுத்திட்டம் - ஆய்வுச்சுருக்கம் தயாரித்தல்.

#### Unit III - Communication technology

Computer Mediated Teaching: Multimedia, E – Content, Satellite Based Communication – EDUSAT and ETV channels. Web: Internet I Education.



#### **Unit IV - Pedagogical Skills**

Micro teaching Skills: Skill of Induction, Skill of Stimulus Variation. Skill of Explaining, Skill of Probing Questions, Skill of Blackboard, Writing and Skill of Closure –Integration of Teaching Skills – Evaluation of Teaching Skills – Research Extension and Consultancy.

#### **Unit V - Industrial Technology**

Lecture Techniques: Steps, Planning of a lecture, Lecture Notes, Updating, Delivery of Lecture. Teaching – Learning Techniques: Team teaching, Group Discussion. Seminar, Workshops, Symposium and Panel Discussion – Games and Simulations – Web Based Instructions.

#### **References**

- Micael D. and William (2000). Integrating Technology into Teaching and Learning: Concepts and Applications, Prentice Hall, New York.
- Information and Communication Technology in Education: A Curriculum for Schools and Programme of Teacher development. Jonathan Anderson
- Pandey S.K.(2005). Teaching communication. Commonwealth publisher, Delhi
- Sharma. R.A.(2006), Fundamentals of education technology, Surya publication, Meerut
- Kum Babu A. and Dandapani S. (2006), Microteaching, Neelkamal Publications, Hyderabad
- Vanaja M and Rajasekhar S. (2006), Computer Education, Neelkamal Publications, Hyderabad

**II- SEMESTER**  
**Core- IV- GUIDE PAPER 1: ADVANCES IN PLANT SCIENCE – ABO214**

**Credits : 4**

**Hours : 6**

**UNIT-I**

*In vitro* regeneration of virus free plants, development of transgenic plant through Agro bacterium mediated gene transfer, status of plant derived vaccines, Analysis of gene transfer by PCR, Southern and Northern Blotting, Immobilization of enzymes. Conversion of solar energy to chemical energy. Waste water treatment using nanoparticles.

**UNIT-II**

Bioremediation and phytoremediation. Research involving animal studies- Urolithiasis, cancer, diabetes and wound. Medicinal lplant diversity with respect to Environmental factors. Biofertilizer and Biopesticide, Differential display, subtractive hybridization.

**UNIT- III**

Pharmaceutical substances of plant origin- alkaloid, flavanoids, aspirin- Drug discovery- Molecular drug designing- delivery of Biopharmaceuticals- oral delivery system, pulmonary delivery, nasal delivery, transmucosal and transdermal epidermal system.

**UNIT- IV**

Clinical trials- pharmacokinetics and pharmacodynamics and toxicity study, clinical trial design, trial size and study population. Role and remit of regulatory authorities- Food and drug administration. Patenting of biotechnological invention.

**REFERENCES:**

1. Instant notes in Molecular Biology- Phil Turner, Alexander Mc Lennan Andy Bates and Mike White.
2. A textbook of Biotechnology – R.C.Dubey
3. Biopharmaceuticals- Biochemistry and Biotechnology- second edition- Gary Walsh
4. Biotechnology – U.Sathyanarayana
5. Biotechnology Expanding horizons- B.D.Singh

## **GUIDE PAPER- 2: NANOTECHNOLOGY - ABO214**

### **Unit-I**

Use of bacteria, fungi, actinomycetes for nanoparticle synthesis, Magnetotactic bacteria for natural synthesis of magnetic nanoparticle, Mechanism of formation, Virus as a components for the formation of nanstructured materials. Synthesis of silver and gold nanoparticles. Role of plants in nanoparticle synthesis.

### **Unit- II**

Nanoscience in Nano materials preparation silver, gold, iron and copper. Characterization – UV-Visible Spectrophotometer, X-RD, FTIR, SEM-EDAX, TEM.

### **Unit-III**

DNA based computation, DNA based nanomechanical devices, Interaction between biomolecules and nanoparticle surface, Different types of inorganic materials used for the synthesis of hybrid nano bio assemblies, Application of nano in biology, Nanoprobes for analytical application.

### **Unit-IV**

Nanomedicines : Developing of Nanomedicines. Nanosystems in use. Protocol for nanodrug administration. Nanotechnology in diagnostic applications, materials used in diagnostic and therapeutic applications- Molecular Nanomechanics.

### **Unit-V**

Molecular devices, Nanotribiology, studying tribiology at nanoscale, Nanotribiology applications. Current status of Nano Biotechnology, Future perspectives of Nanobiology. Nanosensors.

## **REFERENCES**

1. Michael A. Stroschio and Mitra Dutta. 2004. Biological Nanostructures and Applications of Nanostructures in Biology Electrical, Mechanical, and Optical Properties.
2. K. Eric Drexler, 1992. Nanosystems: Molecular Machinery, Manufacturing, and Computation. Wiley & Sons, Inc.: New York.
3. Robert A. Freitas Jr. Landes 1999. Nanomedicine, Volume I: Basic Capabilities. Bioscience: Georgetown, TX.

4. Robert A. Freitas Jr. Landes, 2003. Nanomedicine, Volume IIA: Biocompatibility. Bioscience: Georgetown, TX. 2003.
5. Robert A. Freitas Jr. and Ralph C. Merkle. Landes , 2004. Molecular Assemblers and Nanofactories: Kinematic Self-Replicating Machines. Bioscience: Georgetown, TX.

### **GUIDE PAPER 3: PLANT BIOTECHNOLOGY - ABO214**

#### **Unit -I**

Plant Tissue Culture – Historical perspective, tissue culture lab. Organization, sterilization techniques, nutrient media, culture techniques- callus cultures, cell cultures and protoplast cultures, role of phytohormones, organogenesis and somatic embryogenesis. Artificial seed production; Micropropagation; Mutation, somaclonal variation, Germplasm conservation and cryopreservation.

#### **Unit -II**

Agrobacterium-plant interaction; Ti and Ri plasmids. Gene transfer techniques - vector mediated and vector less gene transfer. Agrobacterium-mediated gene transfer; Cointegrate and binary vectors and their utility; Screenable and selectable markers; Chloroplast transformation; Marker-free methodologies. Stress Resistance/Tolerance –Bacterial resistance; Viral resistance; Insects and pathogens resistance; Herbicide resistance; Drought, salinity and thermal stress.

#### **Unit- III**

Plants as Biofactories; Fermentation and production of industrial enzymes, vitamins and antibiotics and other biomolecules; secondary metabolite production; Production of pharmaceutically important compounds; Bioenergy generation.

#### **Unit -IV**

Biosafety issues and containment practices. Testing of transgenics, regulatory procedures for commercial approval. Bioethics of plant genetic engineering.

#### **Unit -V**

Intellectual property rights (IPR); Patents, trade secrets, copyright, trademarks; Plant genetic resources; Patenting of biological material; Plant breeders rights (PBRs) and farmers rights.

#### **REFERENCES**

1. M.K. Razdan, 2003. An Introduction to Plant Tissue Culture- Oxford and IBH Publishing.
2. J. Hammond, P.Mc.Garvy and V. Yusibov, 2000. Plant Biotechnology, Springer Verlag..

3. H.S.Chawla, 2002. Introduction to Plant Biotechnology- Oxford and IBH Publishing Co.Pvt.Ltd .
4. Dixon RA, 2003, Plant Cell Culture- IRL Press.
5. F.H.Erbisch and K.M.Maredia, 2000. Intellectual property in Agricultural Biotechnology- ,University Press.
6. Bernard R.Glick and Jack J.Pasternak., 2001. Molecular Biotechnology.Principles and applications of Recombinant DNA Technology, ASM press Washington DC.

## **GUIDE PAPER 4: MYCOLOGY**

**Unit-1:** Introduction & Historical overview of mycology, General characteristics-Importance of fungi in Human life, Fungi –Taxonomy and Systematics.

**Unit-2:** Fungal Morphology, Isolation and Identification, Metabolism, Fungal Growth Reproduction and Life cycles.

**Unit-3:** Mushroom cultivation. Mycotoxins, Mushroom poisoning and their medicinal relevance, Identification of edible and poisonous mushrooms. Economic importance of fungi. Phylum: Chytridiomycota – *Rhizophlyctis rosea*, Glomeromycota – AM mycorrhiza, Zycomycota -*Mucor*, *Rhizopus*, Ascomycota – *Saccharomyces cerevisiae*, *Morels*, Basidiomycota - *Agarics*, *Puccinia*.

**Unit-4:** Deuteromycota – *Penicillium*, *Tomato blight*, *Atlet foot*. Oomycota – mildew, *Potato blight*. Lichens – overview. Culture methods in lichens, separation of lichen symbionts. Ecological importance of Fungi – Mycorrhiza, Lichens.

**Unit-5:** Medical mycology – Culture methods fungi, Diagnosis, Dimorphism Mycoses (Superficial) (Opportunistic) Systemic) -Host responses to fungal infection-Immunity Antifungal agents. Antibiotic and Elementary Industrial Mycology.

### **TEXT BOOK & REFERENCES:**

1. Fungal Biology, 4th ed. (2006) by Jim Deacon
2. The Growing Fungus (1995) by Neil A. Gow and Geoffrey M. Gadd (eds.)
3. The Fifth Kingdom, 3rd ed. (2001) by Bryce Kendrick
4. The Fungi, 2nd ed. (2001) by Michael J. Carlile, Sarah C. Watkinson, and Graham W. Gooday
5. Topley & Wilson's Microbiology and Microbial Infections, Volume 4: Medical Mycology -- by Leslie Collier, et al;
6. Medical Mycology and Human Mycoses -- Everett Smith, Ph.D. Beneke, Alvin Lee, Ph.D. Rogers

**DISSERTATION + VIVA-VOCE – ABOP21**