

**M.Sc. Botany Course Outcomes Summary Sheet**

Course	Title	Course Outcome 1	Course Outcome 2	Course Outcome 3	Course Outcome 4	Course Outcome 5	Course Outcome 6	Course Outcome 7
M.Sc. Previous (Botany)	Paper 1: Cell and Molecular Biology of Plants:	Master the Fundamentals of Plant Cell Structure and Function	Unravel the Secrets of Chloroplast and Mitochondrial Biology	Navigate the World of Gene Expression and Regulation	Demystify Protein Synthesis and Targeting	Understand the Dynamics of Cell Shape and Motility	Gain Insights into Cell Cycle Control and Death	Become Adept in Advanced Cellular Imaging Techniques
M.Sc. Previous (Botany)	Paper 2: Cytology, Genetics, and Cytogenetics:	Demystifying Chromatin Organization and Karyotypes	Delving into the Genetics of Organelles	Understanding Gene Structure and Expression	Navigating the World of Mutations and Repair	Exploring Sex Determination and Aneuploidy	Embracing Molecular Cytogenetics Techniques	Understanding Alien Gene Transfer and Chromosome Manipulation
M.Sc. Previous (Botany)	Paper 3: Biology and Diversity of Lower Plants:	Master the World of Algae	Demystifying the Kingdom of Fungi	Unveiling the Secrets of Bryophytes	Navigating the World of Pteridophytes	Develop Analytical Skills in Identifying and Classifying Lower Plants	Appreciate the Ecological and Economic Significance of Lower Plants	Gain Expertise in Research Techniques
M.Sc. Previous (Botany)	Paper 4: Taxonomy and Diversity of Seed Plants:	Demystifying the World of Gymnosperms	Navigating the Complexities of Evolution and Species Delimitation	Mastering the Art of Taxonomic Categorization and Nomenclature	Understanding the Evolution and Importance of Angiosperm Classification Systems	Appreciating the Biogeographical Distribution of Plants	Developing Critical Thinking and Analytical Skills	Building Expertise in Research and Communication
M.Sc. Previous (Botany)	Paper 5: Plant Physiology and Biochemistry:	Master the Interplay of Water Relations and Membrane Transport	Demystify the Secrets of Photosynthesis	Navigate the Complexities of Cellular Respiration and Metabolism	Understand the Orchestration of Plant Growth by Hormones	Decode the Mysteries of Flowering and Plant Responses to Environmental Cues	Develop Robust Analytical and Problem-Solving Skills	Gain Hands-on Experience with Biochemical Techniques
M.Sc. Previous (Botany)	Paper 6: Microbiology and Plant Pathology:	Master the Diversity and Significance of Microbes	Demystify the World of Viruses and Viral Diseases	Appreciate the Scope and Applications of Microbiology	Unravel the Mysteries of Immunity and Antibody Engineering	Explore the Frontiers of Bio-Technology and Plant Pathology	Master the Principles and Practices of Plant Disease Management	Gain Practical Skills in Identifying and Controlling Plant Diseases
M.Sc. Final (Botany)	Paper 7: Plant Morphology, Anatomy, Developmental and Reproductive Biology:	Demystifying the Uniqueness of Plant Development	Mastering Seed Germination and Early Plant Establishment	Deciphering the Mysteries of Leaf and Root Formation	Unveiling the Wonders of Plant Reproduction	Mastering the Male and Female Gametophyte	Understanding the Intricacies of Pollination and Fertilization	Expanding Your Practical Skills and Analytical Abilities
M.Sc. Final (Botany)	Paper 8: Plant Ecology:	Master the Foundation of Ecological Concepts	Analyze Population Dynamics and Community Structure	Explain the Mechanisms of Vegetation Development	Comprehend the Structure and Function of Ecosystems	Evaluate Ecosystem Stability and Resilience	Explore the Interplay of Biomes, Biodiversity, and Climate Change	Develop Practical Skills and Critical Thinking
M.Sc. Final (Botany)	Paper 9: Plant Resource Utilization and Conservation:	Mastering the Value of Plant Biodiversity	Understanding Sustainable Development	Appreciating the Diversity and Uses of Cultivated Plants	Exploring Timber, Fuel, and Non-Timber Forest Products	Evaluating the Green Revolution and Future Food Security	Recognizing the Role of Plants in Urban Environments	Developing Conservation Strategies and Awareness
M.Sc. Final (Botany)	Paper 10: Plant Biotechnology and Genetic Engineering of Plants and Microbes:	Master the Core Concepts of Biotechnology	Navigate the World of Plant Cell and Tissue Culture	Explore the Potential of Somatic Hybridization	Unveil the Diverse Applications of Plant Tissue Culture	Demystify Recombinant DNA Technology	Engineer Plants for Improved Traits	Explore the Frontiers of Microbial Genetic Manipulation and Genomics
M.Sc. Final (Botany)	Paper 11: Biotechnology-I:	Master the Power of Totipotency and Plant Tissue Culture Techniques	Navigate the Plant Tissue Culture Laboratory	Explore Diverse Pathways of Plant Regeneration	Delve into the Intricacies of Somatic Embryo-genesis	Unleash the Power of Pollen Embryogenesis	Master the Techniques of Protoplast Isolation and Culture	Appreciate the Practical Applications of Plant Tissue Culture
M.Sc. Final (Botany)	Paper 12: Biotechnology-II:	Master the Concepts and History of Transgenic Plants	Demystify Agrobacterium-mediated Transformation	Explore Alternative DNA Transfer Methods	Master the Tools of Genetic Transformation	Navigate the Regulation of Gene Expression	Unleash the Power of Transgenic Crops	Explore the Production of Valuable Products

### M.Sc. Botany Program Summary Sheet:

S.NO.	Program Outcomes (POs):	Program Specific Outcomes (PSOs):	Program Educational Objectives (PEOs):
<b>PO1/PSO1/PEO1</b>	PO1. Demonstrate strong knowledge of plant biology, encompassing cell structure and function, plant genetics, plant physiology, plant development, taxonomy, diversity, ecology, resource utilization, conservation, and biotechnology.	PSO1. Apply advanced knowledge of plant cell and molecular biology to research and practical applications.	PEO1. Contribute to the advancement of knowledge and innovation in plant biology through research and development.
<b>PO2/PSO2/PEO2</b>	PO2. Analyze and interpret data related to plant biology effectively.	PSO2. Apply advanced knowledge of plant genetics and cytogenetics to research and breeding programs.	PEO2. Contribute to sustainable agriculture and environmental conservation through the application of plant biological knowledge.
<b>PO3/PSO3/PEO3</b>	PO3. Communicate plant biology knowledge effectively both verbally and in writing.	PSO3. Evaluate ecological interconnectedness of life on earth and its implications for plant biology.	PEO3. Address the socio-economic challenges related to plant sciences.
<b>PO4/PSO4/PEO4</b>	PO4. Work effectively in teams and independently on plant-based projects.	PSO4. Integrate knowledge of botany for global sustainable development.	PEO4. Take up and shape successful careers in diverse fields of botany.
<b>PO5</b>	PO5. Apply knowledge of plant biology to solve real-world problems in agriculture, conservation, and biotechnology.		
<b>PO6</b>	PO6. Design and conduct research experiments in various fields of plant biology.		
<b>PO7</b>	PO7. Use modern botanical techniques and advanced equipment for plant research and analysis.		

**Mapping of Course Outcomes of all courses of M.Sc. Botany with Program Outcomes, Program Specific Outcomes, and Program Educational Objectives**

Course Outcomes	Program Outcomes	Program Specific	Program Educational	Level
<b>M.Sc. Previous (Botany) Paper 1: Cell and Molecular Biology of Plants:</b>				
Master the Fundamentals of Plant Cell Structure and Function	PO1	PSO1	PEO1, PEO4	Understand, Medium
Unravel the Secrets of Chloroplast and Mitochondrial Biology	PO1	PSO1	PEO1, PEO4	Understand, Hard
Navigate the World of Gene Expression and Regulation	PO1, PO2	PSO1	PEO1, PEO4	Understand, Hard
Demystify Protein Synthesis and Targeting	PO1	PSO1	PEO1, PEO4	Understand, Hard
Understand the Dynamics of Cell Shape and Motility	PO1	PSO1	PEO1, PEO4	Understand, Hard
Gain Insights into Cell Cycle Control and Death	PO1	PSO1	PEO1, PEO4	Understand, Hard
Become Adept in Advanced Cellular Imaging Techniques	PO7	PSO1	PEO1, PEO4	Apply, Hard
<b>M.Sc. Previous (Botany) Paper 2: Cytology, Genetics, and Cytogenetics:</b>				
Demystifying Chromatin Organization and Karyotypes	PO1	PSO2	PEO1, PEO4	Understand, Medium
Delving into the Genetics of Organelles	PO1	PSO2	PEO1, PEO4	Understand, Hard
Understanding Gene Structure and Expression	PO1, PO2	PSO2	PEO1, PEO4	Understand, Medium
Navigating the World of Mutations and Repair	PO1	PSO2	PEO1, PEO4	Understand, Medium
Exploring Sex Determination and Aneuploidy	PO1	PSO2	PEO1, PEO4	Understand, Medium
Embracing Molecular Cytogenetics Techniques	PO7	PSO2	PEO1, PEO4	Apply, Hard
Understanding Alien Gene Transfer and Chromosome Manipulation	PO1	PSO2	PEO1, PEO4	Understand, Hard
<b>M.Sc. Previous (Botany) Paper 3: Biology and Diversity of Lower Plants:</b>				
Master the World of Algae	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Demystifying the Kingdom of Fungi	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Unveiling the Secrets of Bryophytes	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Navigating the World of Pteridophytes	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Develop Analytical Skills in Identifying and Classifying Lower Plants	PO2, PO3	PSO3	PEO2, PEO4	Apply, Medium
Appreciate the Ecological and Economic Significance of Lower Plants	PO3, PO5	PSO3	PEO2, PEO4	Understand, Easy
Gain Expertise in Research Techniques				Apply, Hard
<b>M.Sc. Previous (Botany) Paper 4: Taxonomy and Diversity of Seed Plants:</b>				

Demystifying the World of Gymnosperms	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Navigating the Complexities of Evolution and Species Delimitation	PO1, PO2	PSO3	PEO1, PEO4	Understand, Hard
Mastering the Art of Taxonomic Categorization and Nomenclature	PO3, PO5	PSO3	PEO2, PEO4	Apply, Medium
Understanding the Evolution and Importance of Angiosperm Classification Systems	PO1, PO3	PSO3	PEO1, PEO4	Understand, Medium
Appreciating the Biogeographical Distribution of Plants	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Developing Critical Thinking and Analytical Skills	PO2, PO4	PSO3	PEO1, PEO4	Apply, Hard
Building Expertise in Research and Communication	PO6, PO3	PSO3	PEO1, PEO4	Apply, Hard

**M.Sc. Previous (Botany) Paper 5: Plant Physiology and Biochemistry:**

Master the Interplay of Water Relations and Membrane Transport	PO1, PO2	PSO3	PEO2, PEO4	Understand, Hard
Demystify the Secrets of Photosynthesis	PO1, PO2	PSO3	PEO2, PEO4	Understand, Hard
Navigate the Complexities of Cellular Respiration and Metabolism	PO1, PO2	PSO3	PEO2, PEO4	Understand, Hard
Understand the Orchestration of Plant Growth by Hormones	PO1, PO2	PSO3	PEO2, PEO4	Understand, Medium
Decode the Mysteries of Flowering and Plant Responses to Environmental Cues	PO1, PO2	PSO3	PEO2, PEO4	Understand, Medium
Develop Robust Analytical and Problem-Solving Skills	PO2, PO4	PSO3	PEO1, PEO4	Apply, Hard
Gain Hands-on Experience with Biochemical Techniques	PO7	PSO3	PEO1, PEO4	Apply, Hard

**M.Sc. Previous (Botany) Paper 6: Microbiology and Plant Pathology:**

Master the Diversity and Significance of Microbes	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Demystify the World of Viruses and Viral Diseases	PO1, PO2	PSO3	PEO2, PEO4	Understand, Medium
Appreciate the Scope and Applications of Microbiology	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Unravel the Mysteries of Immunity and Antibody Engineering	PO1, PO2	PSO3	PEO1, PEO4	Understand, Hard
Explore the Frontiers of Bio-Technology and Plant Pathology	PO1, PO2	PSO3	PEO1, PEO4	Understand, Medium
Master the Principles and Practices of Plant Disease Management	PO1, PO5	PSO3	PEO2, PEO4	Apply, Hard

Gain Practical Skills in Identifying and Controlling Plant Diseases				Apply, Hard
<b>M.Sc. Final (Botany) Paper 7: Plant Morphology, Anatomy, Developmental and Reproductive Biology:</b>				
Demystifying the Uniqueness of Plant Development	PO1	PSO1	PEO1, PEO4	Understand, Medium
Mastering Seed Germination and Early Plant Establishment	PO1	PSO1	PEO2, PEO4	Understand, Medium
Deciphering the Mysteries of Leaf and Root Formation	PO1, PO2	PSO1	PEO2, PEO4	Understand, Medium
Unveiling the Wonders of Plant Reproduction	PO1, PO2	PSO1	PEO1, PEO4	Understand, Medium
Mastering the Male and Female Gametophyte	PO1, PO2	PSO1	PEO1, PEO4	Understand, Medium
Understanding the Intricacies of Pollination and Fertilization	PO1, PO2	PSO1	PEO1, PEO4	Understand, Medium
Expanding Your Practical Skills and Analytical Abilities	PO6, PO2	PSO1	PEO1, PEO4	Apply, Hard
<b>M.Sc. Final (Botany) Paper 8: Plant Ecology:</b>				
Master the Foundation of Ecological Concepts	PO1	PSO3	PEO1, PEO4	Understand, Medium
Analyze Population Dynamics and Community Structure	PO1, PO2	PSO3	PEO2, PEO4	Analyze, Hard
Explain the Mechanisms of Vegetation Development	PO1, PO2	PSO3	PEO2, PEO4	Understand, Hard
Comprehend the Structure and Function of Ecosystems	PO1, PO2	PSO3	PEO2, PEO4	Understand, Medium
Evaluate Ecosystem Stability and Resilience	PO1, PO2	PSO3	PEO2, PEO4	Analyze, Hard
Explore the Interplay of Biomes, Biodiversity, and Climate Change	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Develop Practical Skills and Critical Thinking	PO6, PO2	PSO3	PEO1, PEO4	Apply, Hard
<b>M.Sc. Final (Botany) Paper 9: Plant Resource Utilization and Conservation:</b>				
Mastering the Value of Plant Biodiversity	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Understanding Sustainable Development	PO3, PO5	PSO3	PEO2, PEO4	Understand, Medium
Appreciating the Diversity and Uses of Cultivated Plants	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Exploring Timber, Fuel, and Non-Timber Forest Products	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium
Evaluating the Green Revolution and Future Food Security	PO2, PO3	PSO3	PEO2, PEO4	Analyze, Hard
Recognizing the Role of Plants in Urban Environments	PO1, PO3	PSO3	PEO2, PEO4	Understand, Medium

Developing Conservation Strategies and Awareness	PO1, PO2	PSO3	PEO1, PEO4	Analyze, Hard
<b>M.Sc. Final (Botany) Paper 10: Plant Biotechnology and Genetic Engineering of Plants and Microbes:</b>				
Master the Core Concepts of Biotechnology	PO1, PO3	PSO3, PSO4	PEO1, PEO4	Understand, Medium
Navigate the World of Plant Cell and Tissue Culture	PO1, PO6	PSO3	PEO1, PEO4	Understand, Medium
Explore the Potential of Somatic Hybridization	PO1, PO2	PSO3	PEO1, PEO4	Analyze, Hard
Unveil the Diverse Applications of Plant Tissue Culture	PO3, PO5	PSO3	PEO2, PEO4	Understand, Medium
Demystify Recombinant DNA Technology	PO1, PO2	PSO3	PEO1, PEO4	Understand, Hard
Engineer Plants for Improved Traits	PO1, PO3	PSO4	PEO1, PEO4	Analyze, Hard
Explore the Frontiers of Microbial Genetic Manipulation and Genomics	PO1, PO3	PSO3	PEO1, PEO4	Understand, Hard
<b>M.Sc. Final (Botany) Paper 11: Biotechnology-I:</b>				
Master the Power of Totipotency and Plant Tissue Culture Techniques	PO1, PO2	PSO3	PEO1, PEO4	Understand, Hard
Navigate the Plant Tissue Culture Laboratory	PO6, PO7	PSO3	PEO1, PEO4	Apply, Hard
Explore Diverse Pathways of Plant Regeneration	PO1, PO2	PSO3	PEO1, PEO4	Understand, Medium
Delve into the Intricacies of Somatic Embryo-genesis	PO1, PO2	PSO3	PEO1, PEO4	Understand, Hard
Unleash the Power of Pollen Embryogenesis	PO1, PO2	PSO3	PEO1, PEO4	Understand, Medium
Master the Techniques of Protoplast Isolation and Culture	PO6, PO7	PSO3	PEO1, PEO4	Apply, Hard
Appreciate the Practical Applications of Plant Tissue Culture	PO3, PO5	PSO3	PEO2, PEO4	Understand, Medium
<b>M.Sc. Final (Botany) Paper 12: Biotechnology-II:</b>				
Master the Concepts and History of Transgenic Plants	PO1, PO3	PSO4	PEO1, PEO4	Understand, Medium
Demystify Agrobacterium-mediated Transformation	PO1, PO6	PSO3	PEO1, PEO4	Understand, Hard
Explore Alternative DNA Transfer Methods	PO1, PO2	PSO3	PEO1, PEO4	Understand, Medium
Master the Tools of Genetic Transformation	PO1, PO2	PSO3	PEO1, PEO4	Understand, Hard
Navigate the Regulation of Gene Expression	PO1, PO2	PSO3	PEO1, PEO4	Understand, Hard
Unleash the Power of Transgenic Crops	PO1, PO3	PSO4	PEO1, PEO4	Understand, Medium
Explore the Production of Valuable Products	PO1, PO2	PSO3	PEO1, PEO4	Understand, Medium