

FACULTY OF LIFE SCIENCES

SYLLABUS

Of

Botany For

M.Sc. Botany (Semester I)

(Under Continuous Evaluation System)

Session: 2020-21



The Heritage Institution

**KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)**

KanyaMahaVidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science in Botany Semester I Session-2020-21

Course Code	Course Type	Course Title	Hours/ Week	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
MBTL-1071	C	Fungi and Plant Pathology	3	50	40	-	10	3
MBTL-1072	C	Phycology	3	50	40	-	10	3
MBTL-1073	C	Plant Physiology	3	50	40	-	10	3
MBTL-1074	C	Genetics and Evolution	3	50	40	-	10	3
MBTL-1335	C	Theoretical Biology	3	50	40	-	10	3
MBTL-1046	C	Computer Applications and Bioinformatics	3	50	40	-	10	3
MBTP-1077	C	Botany Practicals I	6	75	-	60	15	3
MBTP-1078	C	Botany Practicals II	6	75	-	60	15	3
		Total		450				

Master of Science in Botany

Session 2020-21

Program Specific Outcomes

- PSO1.** Understand the nature and basic concepts of cell biology, biochemistry, taxonomy and ecology.
- PSO2.** Analyze the relationships among animals, plants and microbes.
- PSO3.** Perform procedures as per laboratory standards in the areas of biochemistry, bioinformatics, taxonomy, economic botany and ecology.
- PSO4.** Apply the knowledge of basic science, life Science and fundamental process of plants to study and analyze any plant form.
- PSO5.** Identify the taxonomic position of plants, formulate the research literature, and analyze non reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

Master of Science in Botany Semester-I

Session 2020-21

MBTL-1071 – Fungi and Plant Pathology

Course outcomes

After passing this course the student will be able to

CO: 1 Explain sources of diversity in the fungal kingdom

CO: 2 To understand the major virulence mechanisms that phytopathogens employ to colonize plants.

CO: 3 Develop an appreciation for the strategies that can be employed to incorporate disease resistance in crop plants.

Master of Science in Botany Semester-I

Session 2020-21

MBTL-1072 Phycology

Course Outcomes

After passing this course the student will be able to:

CO:1 Identify and classify different species of algae.

CO:2 Have an overview of the biology of algae.

CO:3 Use the study of algae to provide a basis for understanding the evolutionary pathways to higher plants.

CO:4 Understand the role of algae in various environments as primary producers, suppliers of nutrition and resources for humans.

Master of Science in Botany Semester-I

Session 2020-21

MBTL-1073 Plant Physiology

Course outcomes

After passing this course the student will be able to:

CO:1 Understand the relationship between structure and function as it relates to plant macromolecules, cells, and tissues.

CO: 2 Understand the interaction between the environment, plant growth and development

CO:3 Gain an appreciation of the metabolic and physiological processes unique to plant

CO:4 Acquire a comprehension of plant biology from the sub cellular to the organism level.

Master of Science in Botany Semester-I

Session 2020-21

MBTL-1074 Genetics and Evolution

Course Outcomes

After passing this course the student will be able to

CO:1 Understand chemical basis of heredity.

CO:2 Understand genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.

CO:3 Understand the effect of broad societal issues including health and disease, food and natural resources, environmental sustainability etc.

CO:4 Understand the role of genetic mechanisms in evolution.

Master of Science in Botany Semester-I

Session 2020-21

MBTL-1075 – Theoretical Biology

Course Outcomes

After passing this course the student will be able to:

CO: 1 Formulate discrete and differential equation models that represent a range of biological problems, including identifying assumptions that are appropriate for the problem to be solved.

CO: 2 Choose and apply computational tools to perform parameter estimation and to solve discrete and differential equation models.

CO:3 Interpret model and data output in terms of the original biological problem, and use results to direct a follow-up experiment.

CO:4 Perform appropriate data manipulations, and graphically display model output and data clearly and accurately.

Master of Science in Botany Semester-I

Session 2020-21

MBTL-1046 Computer Applications and Bioinformatics

Course outcomes

After passing this course the student will be able to:

CO:1 Apply knowledge and awareness of the basic principles and concepts of biology, computer science and bioinformatics

CO:2 Use existing software effectively to extract information from large databases and to use this information in computer modeling

CO:3 Develop problem-solving skills, including the ability to develop new algorithms and analysis methods

CO:4 Develop an understanding of the intersection of life and information Science, the core of shared concepts, language and skills the ability to speak the language of structure-function relationships, information theory, gene expression, and database queries

Master of Science in Botany Semester-I

Session 2020-21

Botany Practicals I

(Based on MBTL-1071, MBTL-1072, MBTL-1335)

MBTP-1077

Course Outcomes:

After passing this course the student will be able to:

CO1: Characterize different disease symptoms of crop plants.

CO2: Identify pathogenic organisms responsible for plant diseases.

CO3: Perform different experiments on culturing of plant pathogens.

CO4: Understand different plant defence mechanisms against plant diseases.

CO5: Know about the history and time-scale of land plant evolution, and evaluation of the principal types of evidence underlying.

CO6: Understand algal diversity (incl. morphology, cell structure and level of organization) to phylum level, and their association as lichens.

Master of Science in Botany Semester-I

Session 2020-21

Botany Practicals II

(Based on MBTL-1073, MBTL-1074, MBTL-1046)

MBTP-1078

Course outcomes:

After passing this course the student will be able to:

CO1: understand the lab structure of cytogenetics .

CO2: perform the different types of cell division in various plants.

CO3: perform the molecular level of practicals like DNA isolation .

CO4: understand the morphology of various chromosomes and karyotype analysis.

CO5: Understand Water relation of plants with respect to various physiological processes.

CO6: Interpret the Biological nitrogen fixation in metabolism.

FACULTY OF LIFE SCIENCES

**Syllabus for
M.Sc. Botany**

(Under Continuous Evaluation System)

(SEMESTER: II)

Examinations: 2020-21



Kanya Maha Vidyalaya, Jalandhar

(Autonomous)

The Heritage Institution

Kanya MahaVidyalaya, Jalandhar (Autonomous)
SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE
PROGRAMME

Master of Science (Botany) Semester II
Session-2020-21

Course Code	Course Type	Course Title	Hours/ week	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
MBTL-2071	C	Bryology	3	50	40	-	10	3
MBTL-2072	C	Pteridology	3	50	40	-	10	3
MBTL-2073	C	Diversity and Biology of Gymnosperms	3	50	40	-	10	3
MBTL-2074	C	General Microbiology	3	50	40	-	10	3
MBTL-2075	C	Cell Biology	3	50	40	-	10	3
MBTL-2076	C	Ecological Modelling and Forest Ecology	3	50	40		10	3
MBTP-2077	C	Botany Practicals I	6	75	-	60	15	3
MBTP-2078	C	Botany Practicals II	6	75	-	60	15	3
MBTV-2079	C	On Job Training or Assignment		Satisfactory/ Not Satisfactory				
		Total		450				

Master of Science (Botany) Semester-II

Session 2020-21

MBTL-2071- Bryology

Course outcomes

After passing this course the student will be able to:

CO1: Understand the main characteristics of bryophytes.

CO2: Identify and classify different species of bryophytes.

CO3: Describe the distinguishing traits of liverworts, hornworts, and mosses.

CO4: Understand land adaptations in the bryophytes.

CO5: Describe the events in the bryophyte lifecycle.

Master of Science (Botany) Semester-II

Session 2020-21

MBTL-2072- Pteridology

Course outcomes

After passing this course the student will be able to:

CO1: Comprehend taxonomic and biological features of Pteridophyta.

CO2: Understand taxonomic and biological features of Pteridophyta.

CO3: Understand land adaptations of Pteridophyta.

Master of Science (Botany) Semester-II

Session 2020-21

MBTL-2073 – Diversity and Biology of Gymnosperms

Course outcomes

After passing this course the student will be able to:

CO1: Describe general characters of gymnosperms.

CO2: Identify and classify different species of gymnosperm.

CO3: Understand the origin of gymnosperms and their distribution on earth surface.

Master of Science (Botany) Semester-II
Session 2020-21
MBTL-2074– General Microbiology

Course outcomes

After passing this course the student will be able to:

CO1: Learn about classification, characteristics, ultrastructure of Prokaryotic and Eukaryotic microbes

CO2: Know about organisms and causal factors responsible for plant diseases & methods of studying plant diseases

CO3: Familiarize with some common plant diseases of India

CO4: Gain knowledge on host parasite interaction process

Master of Science (Botany) Semester-II

Session 2020-21

MBTL-2075– Cell Biology

Course outcomes

After passing this course the student will be able to:

CO1: Learn about structural organization and function of intracellular organelles.

CO2: Gain knowledge on the organization of genes and chromosomes.

CO3: Study about the structure of atoms, molecules and chemical bonds & Composition, structure and function of biomolecules.

CO4: Gain knowledge on cellular communication & cell signaling

Master of Science (Botany) Semester-II

Session 2020-21

MBTL-2076 – Ecological Modelling and Forest Ecology

Course outcomes:

After passing this course the student will be able to:

CO1: Understand the importance of Ecological models in simulating and analyzing the long-term dynamics and stability properties of complex ecological systems.

CO2: Integrate information from different disciplines.

CO3: Understand different Environmental Law & Policy.

CO4: Understand the distribution of vegetation with respect to environment.

Master of Science (Botany) Semester-II
Session 2021-22
Botany Practicals I
MBTL-2077
(Based on MBTL-2071, MBTL-2072 and MBTL-2073)

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand Morphological, reproductive and anatomical structures of plants.

CO2: Understand wood anatomy of gymnosperms.

CO3: Perform different experiments based on microorganisms.

CO4: Culture microorganisms on different media and their future potential.

Master of Science (Botany) Semester-II
Session 2021-22
Botany Practicals II
MBTL-2078
(Based on MBTL-2074, MBTL-2075 and MBTL-2336)

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand structures of various cell organelles.

CO2: Examine cell divisions in plant cells.

CO3: Perform different experiments based on plant ecology.

CO4: Analyze nutrients and pigment contents in plants using various techniques.

FACULTY OF LIFE SCIENCES

SYLLABUS

Of

Botany For

M.Sc. Botany (Semester III)

(Under Continuous Evaluation System)

Session: 2020-21



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SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE
PROGRAMME

Master of Science (Botany) Semester III
Session-2020-21

Course Code	Course Type	Course Title	Hours/ week	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
MBTL-3071	C	Developmental Botany	3	50	40	-	10	3
MBTL-3072	C	Plant Molecular Biology	3	50	40	-	10	3
MBTL-3073	C	Plant Breeding and IPR	3	50	40	-	10	3
MBTL-3074	C	Plant Biochemistry	3	50	40	-	10	3
MBTL-3075	C	Applied Botany	3	50	40	-	10	3
MBTL-3076	C	Plant Morphogenesis	3	50	40		10	3
MBTP-3077	C	Botany Practicals I	6	75	-	60	15	3
MBTP-3078	C	Botany Practicals II	6	75	-	60	15	3
		Total		450				

Master of Science (Botany) Semester III

Session 2020-21

MBTL-3071- Developmental Botany

Course outcomes:

After passing this course the student will be able to:

CO1: Know the structure and development of monocot and dicot embryos.

CO2: Compare the function and morphology of pollen grains.

CO3: Understand different aspects of embryology.

CO4: Understand role of Embryology in Plant Breeding.

Master of Science (Botany) Semester III
Session 2020-21

Plant Molecular Biology

MBTL – 3072

Course outcomes:

After passing this course the student will be able to:

CO1: exhibit a knowledge base in genetics, cell and molecular biology.

CO2: understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.

CO3: Exhibit clear and concise communication of scientific data

CO4: understand different techniques related to molecular biology.

Master of Science (Botany) Semester III
Session 2020-21

Plant Breeding and IPR

MBTL –3073

Course outcomes:

After passing this course the student will be able to:

CO1: Understand historical evolution of plant breeding and different centers of origin.

CO2: Understand sources and types of genetic variation and explain their importance for plant improvement.

CO3: Describe methods that are used in plant breeding.

CO4: Understand IPR (Intellectual property right)

Master of Science (Botany) Semester III
Session 2020-21

Plant Biochemistry

MBTL – 3074

Course outcomes:

After passing this course the student will be able to:

CO1: Understand cellular chemistry, its plant specific components.

CO2: Understand metabolism of lipids and carbohydrates.

CO3: Describe structure, functions and the mechanisms of action of enzymes.

CO4: Learn kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory process.

Master of Science (Botany) Semester III
Session 2020-21

Applied Botany

MBTL – 3075

Course outcomes:

After passing this course the student will be able to:

CO1: demonstrate knowledge of the value of plants in our everyday lives

CO2: identify and describe the impact of economic botany on the environment and society.

CO3: understand commercial use of different forest products.

CO4: demonstrate the ability to interpret scientific data and employ critical thinking to solve problems in applied botany.

Master of Science (Botany) Semester III
Session 2020-21

Plant Morphogenesis

MBTL – 3076

Course outcomes:

After passing this course the student will be able to:

CO1: learn about morphogenesis and organogenesis in plants.

CO2: understand basic principles in plant development.

CO3: read plant development biology literature.

CO4: understand different factors affecting plant morphogenesis.

Master of Science (Botany) Semester III
Session 2020-21
Botany Practicals I
(Based on MBTL-3071, MBTL-3072 and MBTL-3073)

MBTP-3077

Course Outcomes:

After passing this course the student will be able to:

CO1: Perform immobilization of enzymes.

CO2: Wide application of enzymes and their future potential.

CO3: perform different experiments based on plant pollination.

CO4: understand embryology of dicot and monocot plants.

Master of Science (Botany) Semester III
Session 2020-21

Botany Practicals II
(Based on MBTL-3074, MBTL- 3075 and MBTL-3076)

MBTP-3078

Course outcomes:

After passing this course the student will be able to:

CO1: Understand concept of gene, gene cistron relationship in prokaryotes and eukaryotes.

CO2: Understand types of DNA damage, DNA repair pathways.

CO3: Exhibit clear and concise communication of scientific data.

CO4: Understand different techniques related to molecular biology.

FACULTY OF LIFE SCIENCES

SYLLABUS

Of

Botany For

M.Sc. Botany (Semester IV)

(Under Continuous Evaluation System)

Session: 2020-21



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SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Botany) Semester IV

Session-2020-21

Course Code	Course Type	Course Title	Hours/ week	Marks				Examination time (in Hours)
				Total	Ext.		CA	
					L	P		
MBTL-4071	C	Plant Anatomy	3	50	40	-	10	3
MBTL-4072	C	Structure and Metabolism of Plant Hormones	3	50	40	-	10	3
MBTL-4073	C	Plant Tissue Culture and Biotechnology	3	50	40	-	10	3
MBTL-4074	C	Analytical Techniques	3	50	40	-	10	3
MBTL-4075	C	Diversity and Biology of Angiosperms	3	50	40	-	10	3
MBTL-4076(A)	C	Hazardous Chemicals (Optional Paper)	3	50	40		10	3
MBTL-4076(B)	C	Immunology (Optional Paper)	3	50	40		10	3
MBTP-4077	C	Botany Practicals I	6	75	-	60	15	3
MBTP-4078	C	Botany Practicals II	4	75	-	60	15	3
MBTP-4079	C	Field Study	Satisfactory/ Not Satisfactory					
MBTP-4070	C	Research Techniques	3	Satisfactory/ Not Satisfactory				
		Total		450				

M. Sc. Botany (Semester–IV) (Session 2020-21)

Plant Anatomy

MBT L –4071

Course outcomes:

After passing this course the student will be able to:

CO1: Understand anatomy of different types of woods and their commercial utilization.

CO2: Compare anatomy of vegetative and floral parts of flowering plants.

CO3: Relate anatomy of the plant part with their physiological role.

CO4: Understand role of anatomy in taxonomy.

M. Sc. Botany (Semester–IV) (Session 2020-21)

Structure and Metabolism of Plant Hormones

MBTL – 4072

Course outcomes:

After passing this course the student will be able to:

CO1: Understand role of different types of plant hormones in growth and development of plants.

CO2: Understand the mechanism of action and bioassays of plant hormones and their commercial use.

CO3: Relate microbial association with the production of growth regulators.

CO4: Understand biosynthesis of different plant growth regulators.

M. Sc. Botany (Semester–IV) (Session 2020-21)

Plant Tissue Culture and Biotechnology

MBTL – 4073

Course outcomes:

After passing this course the student will be able to:

CO1: Understand the concept of cytogenetics and differentiation in cell and tissue culture.

CO2: Understand mechanism, advantage and disadvantages of micropropagation.

CO3: Describe the role of tissue culture in the production of different types of transgenic plants.

CO4: Explain role of plant tissue culture and biotechnology in different fields of human interest.

M. Sc. Botany (Semester–IV) (Session 2020-21)

Analytical Techniques

MBTL – 4074

Course outcomes:

After passing this course the student will be able to:

CO1: Understand working of different microscopes.

CO2: Understand the basics of the major analytic techniques including sample preparation, standardization and data analysis of each technique.

CO3: Evaluate strengths and weakness of different analytical techniques.

CO4: Understand theory and practice of different bioanalytic techniques.

M. Sc. Botany (Semester–IV) (Session 2020-21)

Diversity and Biology of Angiosperms

MBTL – 4075

Course outcomes:

After passing this course the student will be able to:

CO1: Learn about different systems of classification with their merits and demerits.

CO2: Understand principles of plant nomenclature and plant taxonomy.

CO3: Know about the National and international herbaria and botanical gardens.

CO4: Understand terminology related to plant taxonomy.

M. Sc. Botany (Semester–IV) (Session 2020-21)

**Hazardous Chemicals
(Optional Paper)**

MBTL-4076 A

Course outcomes:

After passing this course the student will be able to:

CO1: Understand different types of hazardous chemicals and how we can expose to them.

CO2: Understand control measures that reduce the risk associated with hazardous chemicals.

CO3: Manage hazardous chemicals effectively.

CO4: Describe the processes involved in hazardous waste treatment.

M. Sc. Botany (Semester–IV) (Session 2020-21)

**Immunology
(Optional Paper)**

MBTL –4076 (B)

Course outcomes:

After passing this course the student will be able to:

CO1: Understand principles of immunology.

CO2: Conceptualize how the innate and adaptive immune responses coordinate to fight invading pathogens.

CO3: Understand role of immunity in keeping our body healthy.

CO4: Exhibit clear and concise communication of scientific data.

M. Sc. Botany (Semester–IV) (Session 2020-21)

Botany Practicals I
(Based on MBTL-4071, MBTL-4072 and MBTL-4073)

MBTP -4077

Course outcomes:

After passing this course the student will be able to:

CO1: Develop skills of dissection,formation of temporary and permanent slides.

CO2: Understand commercial applications of plant growth hormones.

CO3: Perform bioassays of plant growth regulators.

CO4: Study the functions and operations of various instruments used in PTC

M. Sc. Botany (Semester–IV) (Session 2020-21)

**Botany Practicals II
(Based on MBTL-4074 and MBTL-4075)**

MBTP-4078

Course outcomes:

After passing this course the student will be able to:

CO1: Understand and perform experiments based on different analytic techniques.

CO2: Identify different plants using identification keys.

CO3: Explore rich plant biodiversity.

CO4: Compare different species of a genus and different genera of family.