

FACULTY OF LIFE SCIENCES

SYLLABUS

Of

Botany For

Master of Science (Botany)

Semester (I – II)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2022-23



The Heritage Institution
KANYA MAHA VIDYALAYA
JALANDHAR
(Autonomous)

Session: 2022-23
Master of Science (Botany) Semester-I
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.

Session: 2022-23
Master of Science (Botany) Semester-I
Course Title: Fungi and Plant Pathology
Course Code: MBTL-1071

Course outcomes

After passing this course the student will be able to

CO: 1 Explain diversity in the fungal kingdom

CO: 2 Understand life cycle of major genera of fungi

CO: 3 Understand the major virulence mechanisms that phytopathogens employ to colonize plants.

CO: 4 Develop an appreciation for the strategies that can be employed to incorporate disease resistance in crop plants.

Session: 2022-23
Master of Science (Botany) Semester-I
Course Title: Phycology
Course Code: MBTL-1072

Course Outcomes

After passing this course the student will be able to:

CO: 1 Identify and classify different species of algae.

CO: 2 Understand comparative life history of Green and Yellow Green Algae

CO: 3 Provide a comparative account on Brown and Red Algae.

CO: 4 Understand the role of algae from an ecological and economic point of view.

Session: 2022-23
Master of Science (Botany) Semester-I
Course Title: Bryology
Course Code: MBTL-1073

Course outcomes

After passing this course the student will be able to:

CO1: Understand the main characteristics of bryophyte.

CO2: Describe the distinguishing traits of liverworts, hornworts, and mosses.

CO3: Understand evolution in gametophyte and sporogonium in bryophytes.

CO4: Understand means of spore dispersal, peristome teeth and various methods to conserve bryophytes.

Session: 2022-23
Master of Science (Botany) Semester-I
Course Title: Plant Physiology
Course Code: MBTL-1074

Course outcomes

After passing this course the student will be able to:

CO: 1 Understand the water relationship with plants and energy metabolism.

CO: 2 Understand the interaction between the cell and signaling mechanism

CO: 3 Gain an appreciation of the nitrogen metabolism

CO: 4 understands the sulfur chemistry and sulfur metabolism in plants

Session: 2022-23
Master of Science (Botany) Semester-I
Course Title: Genetics and Evolution
Course Code: MBTL-1075

Course Outcomes

After passing this course the student will be able to

CO:1 Understand the concept of genes, genetic material and Mendelian Principles.

CO:2 Understand the biochemistry and molecular biology of cancer and mutations.

CO:3 Understand transposable genetic elements and regulation of Gene expression in prokaryotes

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

Session: 2022-23
Master of Science (Botany) Semester-I
Course Title: Computer Applications and Bioinformatics
Course Code: MBTL-1046

Course outcomes:

A student completing this paper shall be able to apply:

CO: 1 Understand the concept, applications, basic and advanced skills of MS-Word.

CO: 2 Learn problem-solving skills, including the ability to develop new algorithms and analysis methods in Microsoft-Excel.

CO: 3 Understand working with MS-Powerpoint and basic concepts of Bioinformatics.

CO: 4 An understanding of the intersection of life and information sciences, 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.

Session: 2022-23
Master of Science (Botany) Semester-I
Course Title: Botany Practicals I
Course Code: MBTP-1077

(Based on MBTL-1071, MBTL-1072, MBTL-1073)

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

CO4: Understand algal diversity (incl. morphology, cell structure and level of organization) to phylum level, and their association as lichens.

CO5: Understand diversity and morphology of bryophytes

CO6: Identify prominent members of bryophytes

Session: 2022-23
Master of Science in Botany Semester-I
Course Title: Botany Practicals II
Course Code: MBTP-1078

(Based on MBTL-1074, MBTL-1075, MBTL-1046)

Course outcomes:

After passing this course the student will be able to:

CO1: Prepare various biological reagents used in experiments

CO2: Estimate various biological activities in plants.

CO3: Understand the lab structure of cytogenetics and perform the molecular level of practicals like DNA isolation.

CO4: Perform the different types of cell division in various plants.

CO5: Understand basics of computer.

CO6: Interpret data in word and powerpoint files.

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: Pteridology
Course Code: MBTL-2071

Course outcomes

After passing this course the student will be able to:

CO1: Understand taxonomic and biological features of Pteridophyta.

CO2: Understand systematics and life cycles of various Pteridophytes.

CO3: Comprehend the evolutionary trends among different genera of Pteridophytes

CO4: Understand land adaptations and importance of Pteridophytes.

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: Diversity and Biology of Gymnosperms
Course Code: MBTL-2072

Course outcomes

After passing this course the student will be able to:

CO1: Describe general characteristics of gymnosperms.

CO2: Understand the history of gymnosperms.

CO3: Identify and classify different gymnosperm genera and their distribution on the earth's surface.

CO4: Understand origin and evolution of gymnosperms.

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: General Microbiology
Course Code: MBTL-2073

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 viruses and diseases related to viruses.

CO3: understand the water treatment, bioremediation and aeromicrobiology

CO4: Gain knowledge on industrial products related to microbes and control of microbes

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: Cell Biology
Course Code: MBTL-2074

Course outcomes

After passing this course the student will be able to:

CO1: Learn about levels of structural organization, cellular membranes and intracellular transport.

CO2: Gain knowledge on the structural organization and function of intracellular organelles, genes and chromosomes.

CO3: Study about the cell cycle and cell division.

CO4: Gain knowledge on cellular communication & cell signaling.

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: Ecological Modelling and Forest Ecology
Course Code: MBTL-2075

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 species association and diversity.

CO3: Understand the distribution of vegetation with respect to the environment.

CO4: Understand different Environmental Law & Policy.

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: Theoretical Biology
Course Code: MBTL-2336

Course outcomes

After the successful completion of this subject, the students should be able to:

CO 1: Recognize linear function, power function, periodic function, exponential function and trigonometric relation and apply differentiation and integration in real life Scenario .

CO 2: Calculate differentiation and integration of some important functions by using different rules.

CO 3: Understand the concept of random experiment and laws of probability.

CO 4: Use Correlation and Regression to identify the strength and direction of a linear relationship between the variables in real life scenario and manage to solve problems using t test, Chi- Square test and Z-test.

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: Botany Practicals I
Course Code: MBTP-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.

Session: 2022-23
Master of Science (Botany) Semester-II
Course Title: Botany Practicals II
Course Code: MBTP-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.

CO5: Learn application of Statistics in Life Science.

CO6: Analyze and interpret the observations Statistically

Session: 2022-23
Interdisciplinary course
HUMAN RIGHTS AND CONSTITUTIONAL DUTIES
Course Code: IDEH-1313/ IDEH-3313

Course Outcomes

At the end of this course student will be able to:

CO1: Understand the concept of Human rights.

CO2: Analysis different types of human rights.

CO3: Apply the theoretical and practical understanding of the Fundamental Duties in Indian Constitution

Session:2022-23
Interdisciplinary Compulsory Course
BASICS OF COMPUTER APPLICATIONS
Course Code: IDEI-1124/IDEI-3124

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend basics of internet and operate an email account.

CO2: Comprehend basic word processing skills such as text input formatting, editing, cut, copy, paste, spell check, margin, printing, tables, header and footer, etc.

CO3: Apply features of spreadsheet software for data manipulation, data entry, worksheet formatting, functions and formulae.

CO4: Apply skills to make effective presentations using associated application software.

Master of Science (Botany) Semester-III
(Session: 2022-23)
Developmental Botany
MBTL-3071

Course outcomes:

After passing this course the student will be able to:

CO1: Compare the function and morphology of pollen grains.

CO2: Understand various aspects related to fertilization and endosperm development.

CO3: Understand different aspects of embryo development.

CO4: Understand role of Embryology in Taxonomy and Plant Breeding.

Master of Science (Botany) Semester-III
(Session: 2022-23)
Plant Molecular Biology
MBTL – 3072

Course outcomes:

After passing this course the student will be able to:

CO1: Gain knowledge about RNA processing and DNA sequencing.

CO2: Understand different techniques related to molecular biology.

CO3: Understand the structures and purposes of Cloning Vehicles.

CO4: Gain knowledge about genetic cloning and genomics & proteomic techniques.

Master of Science (Botany) Semester-III
(Session: 2022-23)
Plant Breeding and IPR
MBTL –3073

Course outcomes:

After passing this course the student will be able to:

CO1: Understand sources and types of genetic variation and explain their importance for plant improvement.

CO2: Understand historical evolution of plant breeding and different centers of origin.

CO3: Describe methods that are used in plant breeding.

CO4: Understand IPR (Intellectual property right)

Master of Science (Botany) Semester-III
(Session: 2022-23)
Plant Biochemistry
MBTL – 3074

Course outcomes:

After passing this course the student will be able to:

CO1: Understand cellular chemistry and interactions.

CO2: Understand structure, metabolism of carbohydrates.

CO3: Describe structure, functions and metabolism of Lipids.

CO4: Understand kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory processes.

Master of Science (Botany) Semester-III
(Session: 2022-23)
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: Understand commercial use of different forest products.

CO3: Describe various industrial plant products.

CO4: Understand chemical processing of different products in Applied Botany.

Master of Science (Botany) Semester-III
(Session: 2022-23)
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 differentiation in plants.

CO3: Describe plant regeneration processes and tissue relationships.

CO4: Understand different factors affecting plant morphogenesis.

Master of Science (Botany) Semester-III
(Session: 2022-23)
Botany Practicals I
MBTP-3077

(Based on MBTL-3071, MBTL-3072 and MBTL-3073)

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: 2022-23)
Botany Practicals II
MBTP-3078
(Based on MBTL-3074, MBTL- 3075 and MBTL-3076)

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.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
Plant Anatomy
MBTL –4071

Course outcomes:

After passing this course the student will be able to:

CO1: Compare anatomy of primary and secondary growth in roots as well as shoots.

CO2: Understand anatomy of different types of wood and their commercial utilization.

CO3: Understand floral, fruit and seed anatomy.

CO4: Understand anatomy of plant parts in relation to habitat.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
Structure and Metabolism of Plant Hormones
MBTL – 4072

Course outcomes:

After passing this course the student will be able to:

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

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

CO3: Understand biosynthesis, action and uses New class plant hormones.

CO4: Relate microbial association with the production of growth regulators.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
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, differentiation in cell and tissue culture and mechanism, advantage and disadvantages of micro-propagation.

CO2: Understand the mechanism of production of disease resistant, herbicide resistant and pathogen free plants.

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.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
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: Understand working of different spectroscopic techniques.

CO4: Understand theory and practice of different blotting techniques.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
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, origin of angiosperms and phylogeny.
- CO3: Understand the role of various fields of biology in plant taxonomy.
- CO4: Understand the concept of taxonomic tools, aspects related to phytogeography and local plant diversity.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
Hazardous Chemicals
(Optional Paper)
MBTL-4076 (Opt-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.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
Immunology
(Optional Paper)
MBTL-4076(Opt-B)

Course outcomes:

After passing this course the student will be able to:

CO1: Understand history and principles of immunology.

CO2: Conceptualize how the antigen is processed.

CO3: Understand the working of antibodies.

CO4: Understand the cells and tissues of the immune system.

Master of Science (Botany) Semester-IV
(Session: 2022-23)
Botany Practicals I
MBTP -4077

(Based on MBTL-4071, MBTL-4072 and MBTL-4073)

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

Master of Science (Botany) Semester-IV
(Session: 2022-23)
Botany Practicals II
MBTP -4078

(Based on MBTL-4074 and MBTL-4075)

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: Understand role of herbarium in plant taxonomy.

CO4: Understand diagnostic features of different families.