K.K. UNIVERSITY

NALANDA, BIHAR - 803115

SCHOOL OF APPLIED SCIENCES

Master of Science (M.Sc.)

(Two Year Full Programme)

2022-2023

PROGRAMME STRUCTURE & SYLLABUS

M.SC. BOTANY

K.K. UNIVERSITY 803115 NALANDA

Pro Vice Chancellor
KK University
Berauti, Nepura, Bihar Sharif
Nalanda - 803115 (Bihar)

M.Sc. BOTANY (Session 2022-2023)
Programme/Course Structure

Year	Semester	Course Code	Course Title	L	T	P	C
1	1	MSBT 1101	Microbiology, Fungi & Plant Diseases	4	1	0	5
		MSBT 1102	Algae and Bryophyta	4	1	0	5
		MSBT 1103	Pteridophtya, Phytogeography & Limnology	4	1	0	5
		MSBT 1104	Practical I (Based on MSBT 1101, 1102 & 1103)	0	0	2	1
			Total	**12**	**3**	**2**	**16**
	2	MSBT 1201	Gymnosperms and Reproductive Biology	4	1	0	5
		MSBT 1202	Cell Biology, Genetics & Breeding	4	1	0	5
		MSBT 1203	Plant Physiology & Biochemistry	4	1	0	5
		MSBT 1204	Practical II (Based on MSBT 1201, 1202 & 1203)	0	0	2	1
			Total	**12**	**3**	**2**	**16**
2	3	MSBT 2101	Molecular biology and Biotechnology	4	1	0	5
		MSBT 2102	Plant Ecology & Plant Anatomy	4	1	0	5
		MSBT 2103	Angiosperm Taxonomy, Plant Resource, Utilization & Conservation	4	1	0	5
		MSBT 2104	Practical III (Based on MSBT 2101, 2102 & 2103)	0	0	2	1
			Total	**12**	**3**	**2**	**16**
	4	MSBT 2201	Environmental Biology	4	1	0	5
		MSBT 2202	Plant Pathology	4	1	0	5
		MSBT 2203	Practical: Plant Pathology	0	0	2	1
		MSBT 2204	Project /Dissertation	0	0	24	12
			Total	**8**	**2**	**26**	**23**

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SEMESTER: FIRST

MSBT 1101: Microbiology, Fungi & Plant Diseases

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	General introduction; History and scope of microbiology; theory of spontaneous generation Methods of microbiology: Sterilization-Different types of sterilization (moist heat, dry heat, filtration, radiation and chemicals) Diversity of microorganisms: Archaea, Bacteria, Cyanobacteria, Phytoplasma, Rickettsia,	10
II	Structure of bacteria: Ultra structure of Gram positive and Gram negative bacteria; reproduction (vegetative, asexual and genetic recombination); Nutritional classification of bacteria; economic importance of bacteria. Viruses: Nature, characteristics and ultrastructure of Virions (TMV and Bacteriophages), multiplication (Lytic and Lysogenic cycles) and transmission of viruses; economic importance; a brief account of Viroids and Prions.	10
III	Introduction to fungi and their significance to humans, general characteristics of fungi, Fungal Cell, fungal cell walls and fungal organelles, systematics, molecular methods of fungal taxonomy, reproduction and spores in fungi, heterothallism, parasexual cycle and sex hormones in fungi. Biology, general characteristics and importance of Plasmodiophora, acrasiomycota and myxomycota. Biology, general characteristics, classification and brief introduction of Ascomycotina, Basidiomycotina, Deuteromycotina. Phylogeny of fungi, Fungi in industry, medicine and as food, Fungi as bio-control agents.	10
IV	General introduction to Plant disease, History of Plant disease, Classification of Plant Diseases, Kinds and amount of losses, chemical weapons of pathogens – Enzymes and toxins; Role of growth hormones in plant diseases, Pre-existing structural and chemical defense, induced structural and chemical	20
	defense, hypersensitive reaction, role of phytoalexins and other phenolic compound., how the pathogen affects plant physiological functions. Parasitism and disease development, symptoms, effect of environmental factors on the plant disease development, plant disease epidemiology. Some important diseases caused by fungi, bacteria, viruses and mycoplasma (as per location). Control of plant diseases, quarantines and inspection, physical, chemical, cultural and biological methods of disease control, integrated pest management.	

MSBT 1102: Algae and Bryophyta

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	Introduction to Phycology, Principles and systems of classification of algae, Comparative account of algal pigments, food reserves, cell wall, flagellation, chloroplasts and eye-spots, their phylogenetic and taxonomic importance.	5
II	Cell structure and thallus organization, heterocyst and akinete development and their role; chromatic adaptations and reproduction in Cyanophyta, distribution and ecology of cyanobacteria.	5
III	Range of thalli and methods of reproduction in Chlorophyta, evolutionary tendencies in Chlorophyta. A brief account of Bacillariophyta, Pyrrophyta, Haplophyta, Crysophyta, Xanthophyta, Euglenophyta and Prochlorophyta, and other related and recent new groups. Thallus organization and reproduction in Phaeophyta and Rhodophyta.	10
IV	General introduction including broad outline of classification and evolutionary trends of Bryophyta. Distribution of the group in India, general features and adaptation to land habit. Origin and evolution of gametophyte and sporophyte generation. Endemism and endemic liverwort genera of India. Bryophyte ecology.	10
V	Regeneration in bryophytes. Economic uses, chemistry of bryophytes, distribution: Global and Indian. General characteristics, morphology, anatomy and life history of Marchantiales: *Riccia*, *Marchantia*, *Cyathodium*; Metzgeriales: *Riccardia*, *Metzgeria*, *Pallavicinia*; Jungermanniales: *Radula*, *Herberta*, *Porella*.	10
VI	Anthocerotophyta: distribution: Global and Indian, general features, Morphology, anatomy and life history of Anthocerotales: Anthoceros, Notothylas. Bryopsida/Musci: distribution: Global and Indian, general features, morphology and anatomy, life history of Sphagnales: *Sphagnum*, Polytrichales: *Polytrichum*, *Pogonatum*; Bryales: *Bryum*, *Rhodobryum*, *Funaria*.	10

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MSBT 1103: Pteridophtya, Phytogeography & Limnology

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	General Introduction of Pteridophytes, their peculiar features and similarities and dissimilarities with bryophytes and gymnosperms, Pteridophytes classification based on molecular data by Smith et al. 2006. World distribution of Pteridophytes with special reference to India, Endangered Pteridophytes their conservation.	10
II	Origin and Evolution of Pteridophytes, Gametophytes of Pteridophytes, ecology of Pteridophytes. Stomatal structures in Pteridophytes, Spores of Pteridophytes. Apogamy, Apospory and parthenogenesis. Sex organs and embryogeny in Pteridophytes. Ecology of Pteridophytes, Economic importance of the Pteridophytes.	10
III	Comparative morphology, anatomy, reproductive biology and evolutionary studies of the following groups: Early land plant and their evolutionary significance, Psilopsida, Lycopsida, Sphenopsida, Filicopsida. Coenopteridales, Ophioglosales, Marattiales, Osmundales and filicales; Monographic study of *Marsilea, Isoetes, Psilotum, Ophioglossum, Osmunda, Lygodium, Cyathea, Gleichenia, Adiantum, Pteris, Christella* and aquatic ferns.	10
IV	Environmental impact assessment threatened and endangered plant species, role of diversity in ecosystem stability, general account of remote sensing and its application, sustainable development. Major terrestrial biomes, bio-geographical area of India, major vegetations.	10
V	Introduction to Limnology, Properties of water, Lake ontogeny, morphometry, Physical factors: Light Temperature, Heat, and Stratification. Chemical factors: DIC, Oxygen in lakes, profiles, seasonal effects, primary production, effect of DOC and BOD.	5
VI	Redox reactions in the water column and sediment, Size spectrum of planktonic organisms, Size efficiency hypothesis, Food webs: benthic-pelagic coupling, paleo- limnology, Human impact on lack ecosystem.	5

MSBT 1104: Practical I

L	T	P	Cr
0	0	10	5

UNITS	CONTENTS	Contact Hrs.
I	1) Determination of physical characteristics of inland (lentic and lotic) waters. 2) Estimation of Primary Productivity in freshwater bodies. 3) Collection and identification of aquatic plants from different freshwater bodies. 1) Temporary slide preparation and study of common Algae.	**10**
II	2) Principles and use of different sterilization instruments like autoclave, oven. Laminar air flow system etc. 3) Preparation of media (Potato Dextrose Agar). 4) Identification of algal isolates. 5) Isolation of fungi from soil. 6) Identification of fungal isolates. 7) Counting of fungal spore by haemocytometer. 8) Temporary slide preparation and study of common Fungi.	**10**
III	1) Study of common fungal diseases- Rust of linseed, Blight of potato, Rust of wheat, Stem gall of coriander, Downy mildew, Powdery mildew etc.	**10**
IV	1) Study of vegetative habit, anatomy and reproductive morphology of common Bryophyta (*Marchantia, Anthoceros, Riccia, Funaria* etc.). 2) Study of vegetative habit, anatomy and reproductive morphology of common	**10**
V	Pteridophyta (*Psilotum, Lycopodium, Ophioglossum, Marsilea, Selaginella, Equisetum, Azolla, Salvinia* etc.).	

SEMESTER: SECOND

MSBT 1201: Gymnosperms and Reproductive Biology

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	General introduction of gymnosperms with special reference to its salient features, similarities and dissimilarities with other groups like Pteridophytes and angiosperms. Classifications of gymnosperms. Origin and Evolution of gymnosperms with special reference to Pro-gymnosperms, Devonien pre ovules and origin of seed.	10
II	Comparative morphology, anatomy, reproductive biology and phylogenetic studies of the following groups: Pteridospermopsida-Lyginopteridales, Medullosales, Callistophytales, Glossopteridales, Peltaspermales Corystospermales and Caytoniales. Cycadopsida, Pentoxylopsida, Bennettiopsida, Ginkgopsida Coniferopsida and Gnetopsida	12
III	Global distribution of gymnosperms with special reference to Indian plants. Endangered gymnosperms, their conservation and present status. Cytogenetics of Gymnosperms; Economic importance and biotechnology of gymnosperms.	8
IV	Introduction to life history of angiosperms, brief history of plant embryology; Anther: Structure and development wall layers and their role; Micro-sporogenesis: Cytoplasmic reorganization during microsporogenesis, Pollen wall morphogenesis and anther dehiscence; Pollen morphogenesis, Development of male gametophyte, ultra structure, abnormal male gametophyte, Pollen germination.	10
V	Ovule: Ontogeny, structure, integuments and nucellus specialized structures, megasporogenesis; Development of embryo sac, subcellular details of constituent cells and their function, major types. Pollen-pistle interaction: Role of pollen wall proteins and stigma surface proteins, pollen tube growth in pistil, fertilization and apomixes; Endosperm: Major types, ultra structure and histochemistry; Embryo: major types, polyembryony; Embryology in relation to Taxonomy.	10

MSBT 1202: Cell Biology, Genetics & Breeding

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs
I	Cell theory and organization of the cell (Prokaryotic and Eukaryotic) Ultra structure chemical composition of the following: Cell wall, Plasma membrane, Cytoplasm and cytoplasmic organelles (origin, ultra structure & function: Plastids, Mitochondria, Endoplasmic reticulum, ribosomes, Golgi complex, Lysosomes, Peroxisomes and Centrosomes.	**10**
II	Nucleus: Nuclear membrane, nuclear pore, nucleolus and karyolymph Cell division, Cell cycle and apoptosis, Control mechanism, cytokinesis and cell plate formation, physical and chemical properties of DNA and RNA, extra-chromosomal DNA- profile, function and evolution; Chromosome: Organization and special types, Mendelian genetics, Gene interaction, Sex determination; DNA replication, damage and repair, spontaneous and induced mutation, reversion of mutation. Transposition: Structure of transposons, replicative and non-replicative transposition, transposon mutagenesis. Genetic recombination; Molecular models and mechanism, Gene conversion. Gene expression and regulation: Operons and regulons, repression and activation of Lac operon, feed back inhibition and regulation of virulence genes in pathogenic bacteria. Signal transduction in microbes. Use of microbes in genetic engineering	**15**
III	Cytoplasmic inheritance involving chloroplast and mitochondria, interaction between nuclear and cytoplasmic genes, Sex determination in plants, Cytogenetics and Induced Variations: Linkage and recombination: Concept of	**10**
	Linkage, evolution of linkage concept, cis and trans arrangement of linked gene, kinds of linkage, germinal and somatic crossing over, detection of crossing over, kinds of crossing over.	
IV	Mutation: Spontaneous and induced mutations, point mutation, transitions, transversions, physical and chemical mutagens, molecular basis of mutations. Numerical alterations in chromosomes: Euploidy, polyploidy and its significance, aneuploidy, Structural changes in chromosomes: Deficiency, duplication, inversion, translocation heterozygotes.	**10**
V	Plant Breeding: Breeding systems, methods, selection in self and cross pollinated crops, male sterility, self-incompatibility, heterosis and hybrid vigour.	**5**

MSBT 1203: Plant Physiology & Biochemistry

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	Osmotic relations; Transport phenomenon in plants: Transport of water and organic solutes, mechanism of xylem transport, mechanism of phloem transport, phloem loading and unloading. Photosynthesis: Difference between two pigment systems, Light reaction and dark reaction, carbon fixation in C3 and C4 plants; N2 fixation: Non-symbiotic and Symbiotic.	10
II	Plant growth and development: Growth hormones and growth regulators, mode of action of auxin, transport of auxin, physiological role of auxin, Gibberellin: Mode of action and physiological role, Cytokinin: Physiological role and mode of action. Enzymology: Enzymes: structure and classification, cofactors, coenzymes, prosthetic groups, isoenzymes, allosteric enzymes, multi-enzymes, mechanism of enzyme action, properties of enzyme.	10
III	Biochemical Energetics: Glycolysis, TCA cycle, ETS, oxidative phosphorylation, photorespiration; Difference between oxidative phosphorylation and p-hotophosphorylation.	10
IV	Amino acids and proteins: Structure and physiochemical properties of amino acids; Proteins: Primary, secondary, tertiary and quaternary structure of proteins, physical and chemical properties of proteins and biological significance. Enzymes: Classification, physico-chemical nature, enzyme kinetics, mechanism of action and regulation, allosteric enzyme, isoenzyme, zymogen.	10
V	Carbohydrates: Structure and physico-chemical properties of carbohydrates, biological significance, important, glycoprotein, Lipids: Classification, structure and properties of important lipids, biological significance of glycolipids, fatty acid biosynthesis and storage lipids and their catabolism, Vitamins and Coenzymes: Structure and general biochemistry.	10

MSBT 1204: Practical II

L	T	P	Cr
0	0	10	5

UNITS	CONTENTS	Contact Hrs.
I	1) Study of vegetative habit, anatomy and reproductive morphology of common Gymnosperms (*Cycas, Pinus, Ginkgo, Gnetum, Araucaria, Thuja, Junipers, Casuarina, Zamia* etc.).	**10**
II	2) Study of stigma by squash method. 3) Study of pollen germination. 4) Mounting and study of embryo and endosperm. *5)* Study of Mitosis of Onion, *Vicia, Lathyrus*	**10**
III	1) Separation of chlorophyll pigment by paper chromatography. 2) Determination of water potential using plasmolytic method. 3) Estimation of protein by Lowry method. 4) Study of alpha-amylase in germinating seedlings. 5) Separation of amino acids by TLC.	**10**
IV	1) Principle and use of different modern instruments used in Botany. 2) Cytological techniques: Preparation of cytological stains, fixation of sample etc. 3) Mitotic slide preparation of common plant. 4) Meiotic slide preparation of common plant. 5) Karyotype analysis. 6) Calculation of chiasma frequency. 7) Isolation of antibiotic resistant mutant by auxanography technique. 8) Isolation of genomic DNA from cauliflower. 9) Spectrophotometric estimation of DNA by diphenyl method. 10) Separation of DNA by agarose gel electrophoresis. 6) Demonstration of amplification of DNA using PCR.	**20**

SEMESTER: THREE

MSBT 2101: Molecular Biology & Biotechnology

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	Structure and conformation of nucleic acids; Replication of DNA; DNA damage and repair; Gene structure; Transcription of gene; Structure of mRNA, rRNA and tRNA, Regulation of transcription, Posttranscriptional modification of RNA, RNA editing; Transport of RNA.	10
II	Protein synthesis: Genetic code, Mechanism of translation (initiation, elongation and termination); Posttranslational modification; Protein sorting in the cell, Regulation of protein synthesis in prokaryotes and eukaryotes.	10
III	A brief introduction to Biotechnology; Recombinant DNA technology: Restriction endonucleases, DNA Modifying enzymes, DNA polymerases; Vectors, Markers and reporter genes, Cloning, Screening of recombinant clone; Polymerase chain reaction: Principle, method, variants and practical applications; cDNA.	10
IV	Gene cloning and identification: Genomic and cDNA library, Hybridization techniques: Southern, northern and western hybridization; FISH; Molecular markers: RFLP, RAPD, AFLP, SSR, SNP; Functional genomics: Quantitative Real Time PCR, Microarray, RNA interference, Mutagenesis and Genome editing, Protein Production strategies in Expression System; Metagenomics.	10
V	Methods of gene transfer, *Agrobacterium* mediated genetic transformation of plants, Regeneration methodologies and Screening of transformants; Genetic engineering and its applications in Agriculture: Genetic manipulation of pest resistance, abiotic and biotic stress tolerance, Molecular farming; Transformation of chloroplast genome and its advantage; Biosafety concerns in Plant Biotechnology.	10

MSBT 2102: Plant Ecology & Anatomy

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	Introduction to ecology, and environmental terminology, population dynamics, vegetation organization and development: population characteristics, population growth forms, density dependent and density independent controls, population structure (distribution, aggregation, isolation territoriality) energy partitioning , r - and k selection, concept of carrying capacity. Wild life sanctuaries, botanical gardens.	10
II	Concepts of community and continuum, analysis of communities (analytical and synthetic characters), community coefficients, competition, ecological niche, succession, mechanism of ecological succession (relay floristic and initial floristic composition facilitation, tolerance and inhibition models), concept of climax.	10
III	Introduction of morphology and anatomy including brief historical account; External and internal organization of higher plants; Morphology of root and stem and their modifications, Ergastic substances; Microscopic and sub-microscopic structure and organization of cell wall. Meristems: Organization of root apical meristem (RAM) and shoot apical meristem (SAM) differentiation; Quiescent center, Xylem and phloem: Ontogeny and structure of components and phylogeny, transfer cells.	10
IV	Secretary and excretory structures; Primary structure of root and stem, Origin of lateral roots, root-stem transition, nodal anatomy and its evolutionary significance; Leaf –structure and function with special reference to epidermis. Systematic significance of trichomes and stomata.	10
V	Vascular cambium and its derivatives, Primary anomalies in stem and anomalous secondary growth, Floral morphology and anatomy, fruits and seeds; Periderm, Wood structure, Sapwood and Heartwood, Growth rings.	10

MSBT 2103: Angiosperm Taxonomy & Plant Recourse utilization & Conservation

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	Latin diagnosis, definition and use of Taxonomic terms, History of Plant Taxonomy, in India, History of Plant Classification, Need and aim of classification, Units of classification, delimitations of taxa and their practical consideration, Artificial, Natural and Phylogenetic system classification, a critical study of Takhtajan, Modern system of classification, An introduction of angiosperm Phylogeny Group (APG), Characteristics and phylogeny of orders.	12
II	Need and aim of nomenclatures, International rules of Botanical Nomenclature, Concept of species, genus and family with special reference to the type concept; Numerical taxonomy: Principles, concepts, operational taxonomic units (OTUs), data processing and taxonomic studies.	8
III	Inter-relationship of plant taxonomy with morphology, anatomy, embryology, palynology, cytology, genetics, Biosystematics, biochemical and molecular systematics, Numerical taxonomy, Phytogeography and phytochemistry.	10
IV	Indigenous flora of India with special reference to local flora (Bihar), A general knowledge of Herbarium, and Botanical garden of the world and India, Identification keys.	10
V	An introduction to plant utilization, Economic importance of plant for food (cereals, pulses, vegetables, fruits, oils sugar, spices and condiments), non-alcoholic beverages (Tea, coffee, cocoa), medicines, fiber, timber, rubber, tannins and dyes, masticatories, fumicatories, contribution of plants in the development of industries. Conservation of Biodiversity (Phytodiversity) Distinctions between preservation and conservation, Conservation potential index, Protocols for conservations, Traditional conservation practices In-situ and ex-situ conservation Patenting, Intellectual property right, Biosafety protocols People's movements for biodiversity conservation.	10

MSBT 2104: Practical III

L	T	P	Cr
0	**0**	**2**	**1**

UNITS	CONTENTS	Contact Hrs.
I	1) Principle and use of different modern instruments used in Botany. 2) Cytological techniques: Preparation of cytological stains, fixation of sample etc. 3) Mitotic slide preparation of common plant. 4) Meiotic slide preparation of common plant. 5) Karyotype analysis. 6) Calculation of chiasma frequency. 7) Isolation of antibiotic resistant mutant by auxanography technique. 8) Isolation of genomic DNA from cauliflower. 9) Spectrophotometric estimation of DNA by diphenyl method. 10) Separation of DNA by agarose gel electrophoresis. 11) Demonstration of amplification of DNA using PCR.	20
II.	1) Family description of some locally available Plants. 2) Taxonomy and significance of some important medicinal plant of Rajgir. 3) Herbarium Techniques: Plant Collection, Preservation, Identification and making local flora. 4) Field trips within and around the campus, compilation of field notes.	10
III	1) Anamalous secondary growth of some common plants (Tinospora, Boerhaavia, Nyctanthes, Aristolochia, Amaranthus). 2) Staining of Xylem and Phloem elements. 3) Study of different types of stomata (Stomatal index) 4) Study of different types of epidermal hairs.	
IV	1) Study of local vegetation by quadrate method. 2) Study of ecological adaptations (Morphological and anatomical) in plants. 3) Water analysis for pollution studies (Dissolved Oxygen, BOD, and Dissolved Carbon dioxide. Chloride, Alkalinitv etc.). 4) Identification of common aquatic plants, common planktons and bio-indicator species.	**10**

SEMESTER: FOUR

MSBT 2201: Environmental Biology

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	Ecosystem organization, structure and function: primary production (methods of measurement), energy dynamics (tropic organization, energy flow pathway, energy quality, ecological efficiencies), biogeochemical cycles.	10
II	Pollution and climate change: kinds, sources and effects of pollution, heavy metals (Pb, Cd, Hg), green house gases (CO_2, CH_4, N_2O, CFCs), green house effect and global warming, ozone layer depletion and ozone hole, acid rain. Concept of Succession, Nudation, Invasion, Competition and reaction, Stabilization and Climax, Xerosere and Hydrosere and their seral stage. Ecosystem: Abiotic and biotic components; Ecological pyramids; Structural organization of grassland, forest and aquatic ecosystem energetic: laws of thermodynamics, Productivity, energy food chain and ecosystem budget; Biogeochemical cycles.	10
III	Environmental impact assessment threatened and endangered plant species, role of diversity in ecosystem stability, sustainable development. Major terrestrial biomes, bio-geographical area of India, major vegetations. Environmental Pollutions: Air, Water, Soil, waste radioactive and noise pollution; Global warming; green house effect; ozone depletion; Climate change.	10
IV	Organism and population concept; Natality; Mortality; Density; Rate of population increase; r and k selection; Age and sex ratio; Aggregation Interactions among populations: Commensalism, Amensalism, Mutualism, proto-cooperation and Symbiosis, predation and parasitism, competition Intra-specific and inter-specific Plant adaptations.	10
V	Environmental Awareness: Man and Biosphere (MAB); International Union for Conservation of Nature and Natural Resources (IUCN); United Nations Environment Programme (UNEP); World Environmental Day; Wildlife Preservation Act(1972);Indian Forest Conservation Act (1989). Biodiversity concept: origin of the term, themes of biodiversity concept Benefits of Biodiversity: Direct economic benefits to mankind, genetic resources, essential ecosystem services Types of Biodiversity: Genetic, species and ecosystem diversity. Biodiversity conventions and Biodiversity Act2002 Patterns of loss of Biodiversity: Red lists, Red Data Book and Green Book Red Data categories: Extinct, endangered, vulnerable and threatened species. Causes of biodiversity loss and extinction: Natural, genetic and ecological causes; human impacts including development pressure; Habitat loss, encroachments and overexploitation of resources Repercussions of loss biodiversity including future climate change.	10

MSBT 2202: Plant Pathology

L	T	P	Cr
4	1	0	5

UNITS	CONTENTS	Contact Hrs.
I	General introduction to Plant Pathology, History of Plant Pathology, Classification of Plant Diseases, Kinds and amount of losses, chemical weapons of pathogens – Enzymes and toxins; Role of growth hormones in plant diseases, Preexisting structural and chemical defense, induced structural and chemical defense, hypersensitive reaction, role of phytoalexins and other phenolic compound., how the pathogen affects plant physiological functions. Parasitism and disease development, symptoms, effect of environmental factors on the plant disease development, plant disease epidemiology.	15
II	Classification of Plant disease and appearance of symptoms due to different microbes Role of enzyme and toxin in pathogenesis Effect of infection on the physiology of host with special reference to photosynthesis, respiration, nitrogen metabolism and osmo-regulation Host defence mechanism with special reference to structural and biochemical defence	10
III	Some important diseases caused by fungi, bacteria, viruses and mycoplasma. Control of plant diseases, quarantines and inspection, physical, chemical, cultural and biological methods of disease control, integrated pest management.	10
IV	Structure of bacteria: Ultra structure of Gram positive and Gram negative bacteria; reproduction (vegetative, asexual and genetic recombination); Nutritional classification of bacteria; economic importance of bacteria. Viruses: Nature, characteristics and ultrastructure of Virions (TMV and Bacteriophages), multiplication (Lytic and Lysogenic cycles) and transmission of viruses; economic importance; a brief account of Viroids and Prions.	15

MSBT 2202-Practical: Plant Pathology

L	T	P	Cr
0	**0**	**24**	**12**

UNITS	CONTENTS	Contact Hrs.
I	Preparation of culture media, nutrient slants, and petri plates.	**10**
II	Study of common fungal diseases- Rust of linseed, Blight of potato, Rust of whet, Stem gall of coriander, Downy mildew, Powdery mildew etc.	**10**
III	Study of host-parasite interaction of common plant disease and identification of the pathogens.	**10**
IV	Isolation of Plant pathogens from disease specimens and culture.	**10**
V	Camera lucida drawing of fungal spores.	**10**

MSBT 2204: Dissertation / Project

L	T	P	Cr
0	**0**	**10**	**5**

	TOPICS
I	1) Experiments based on phytosocialogical characters (Frequency, Density, Abundance). 2) Identification of common aquatic plants, common planktons and bio-indicator species. 3) Determination of Biomass of primary producer. 4) Study of disease symptoms of local crop area. 5) Pollen study through Melissopalynology. 6) Preparation of ecological monographs of Hydrophytes and Epiphytes. 7) Study of effect of drought on the seed germination and Plant growth vigour. 8) Lichen collection, preservation, identification of local flora (Pant wildlife sanctuary, Rajgir, Nalanda, Bihar). 9) Exploration of Medicinal Plants of Rajgir Hills. 10) Effect of different selective micro/macro nutrients on lesser known leguminous crops.