



TURA GOVERNMENT COLLEGE , TURA

DEPARTMENT OF BOTANY

Syllabus distribution of Smt . Noda Merrie R. Marak for the year 2023-24

(ODD SEMESTER)

1st Semester

Paper1: Theory(Algae, Bryophyte and Pteridophyte)

Unit 2

- 1 .Life cycles of *Anthoceros*, *Marchantia* and *Funaria*.
2. Economic importance of Bryophytes .

Practical : UNIT 4 (Algae, Bryophyte and Pteridophyte)

- 1.Study of vegetative and reproductive parts with the help of temporary preparation of all types of genera prescribed in BOT-100-T.
- 2.Dissection , sectioning , drawing, description and identification of the specimens covered in the preparations.
3. Spotting : Includes those specimens not covered in experiments 1and 2 .
4. Field visit to nearby areas to observe different groups of plants prescribed in the theory syllabus .

Semester 3

Paper3:Theory (Angiosperm taxonomy,Economic Botany, Ethnobotany and Phytogeography)

Unit 2

1. Distinguishing features and economic importance of the following dicotyledonous families: Ranunculaceae , Fabaceae, Asteraceae, Solanaceae and Verbenaceae .



Semester 5

Paper5:Theory (Plant Physiology and Biochemistry)

Unit 2

- 1.Respiration: Glycolysis, Kreb's cycle, Electron transport chain .
2. Photorespiration .

UNIT 4

1. Structure and classification of carbohydrates , amino acids and proteins .
2. Levels of protein structure - primary , secondary and tertiary .

Paper6:Theory(Ecology and Conservation Biology)

Unit 4

- 1.Air, water and soil pollution:sources, effects and abatement
- 2.Global environmental problems: Causes , consequences and remedial measures of ozone layer depletion , climate change and global warming (greenhouse effect) ,Desertification .


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Syllabus distribution of Smt . Noda Merrie R. Marak for the year 2023-24

(EVEN SEMESTER)

2nd Semester

Paper 2: Theory – Gymnosperms , Paleobotany , Morphology and Anatomy

Unit 1

1. Morphology, reproduction and life cycles of Cycas, Pinus and Gnetum .
2. Economic importance of gymnosperms .

4th Semester

Paper4:Theory - Microbiology , Mycology and Plant pathology

Unit 2

1. Growth and nutrition of microbes

Unit 4

5. Disease symptoms, disease cycle and control measures of Late and Early blight of potato, White rust of Crucifers and citrus canker.

6th Semester

Paper 8: Theory – Plant reproductive Biology and Plant Biotechnology

Unit 4

1. Concept of genetic engineering and its application
2. Vectors of gene delivery (Ti Plasmid and Lambda phage)


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3. Tools and techniques of Gene cloning.
4. Achievements in crop biotechnology (insect control and quality improvement) e.g. Golden rice and Bt cotton
5. Introductory bio-informatics

Paper 8: Practical – Plant reproductive biology and Plant Biotechnology

1. Preparation of slides using acetolysis method and study of pollen morphology
2. Excision of endosperm and embryo
3. Estimation of germination percentage of pollen grains using Brewbaker and Kwack's medium .
4. Study of pollen development , microsporogenesis , megasporogenesis , fertilization , endosperm , and embryo using permanent slides .
5. Pollen staining using acetocarmine .
6. Preparation of tissue culture medium and inoculation of explants .


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PORTIONS OF ODD SEMESTER SYLLABUS ALLOTTED TO Dr. SHABAREE YASMEEN A SANGMA.

FIRST SEMESTER

Paper 1 (Theory): Algae, Bryophytes and Pteridophytes

Unit 4:

1. Life Cycle of Lycopodium and Selaginella.
2. Economic and ecological importance of pteridophytes.

THIRD SEMESTER

Paper 3(Theory): Angiosperm taxonomy, Economic Botany, Ethnobotany and Phytogeography

Unit 3:

1. Ethnobotany and its significance; study of some ethnobotanical plants of north Eastern India having medicinal and food values.
2. Cultivation and processing of tea and rubber.

Unit 4:

1. Floristic regions of India
2. Centre of origin of plants (Primary and Secondary centres)

Paper 3(Practical): Angiosperm taxonomy, Economic Botany, Ethnobotany and Phytogeography

1. Taxonomic studies of angiosperm plants belonging to both dicot and monocot families mentioned in paper 3. Flower dissection, drawing and description in technical language, and identification upto Genera.
2. Qualitative detection of starch, protein, fat and cellulose in plant materials by chemical tests.
3. Spotting: Economically important plants or plant products prescribed in paper 3.
4. Techniques for preparation of herbarium sheets of flowering plants and submission of at least 5 herbarium sheets.
5. Study of 5 plants having ethnobotanical importance.
6. One local fieldtrip of botanical relevance.


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FIFTH SEMESTER

Paper 5: Plant Physiology and Biochemistry (Theory)

Unit 2:

1. Biological Nitrogen fixation, assimilation of ammonia

Paper 5 Practical: Plant Physiology and Biochemistry

1. Study of transpiration rate in Dorsiventral leaves by Blackman's apparatus.
2. Determination of water potential by plasmolytic and gravimetric method
3. Study of the effect of light of light on oxygen evolution during photosynthesis by Wrinkler's method
4. Preparation of standard curves for estimation of the following
 - a) Starch by I_2KI method
 - b) Amino acid by Ninhydrin reagent
5. Separation of amino acid by paper chromatography
6. Effect of substrate concentration by amylase activity

Paper 6 (Theory): Ecology and Conservation Biology

Unit 4:

1. Plant Diversity and Conservation: Magnitude of vascular plant diversity in India, Plant conservation measures – in-situ (Biosphere Reserve, National Parks, Wild life Sanctuary, World Heritage Site and Community Conserved Area) and ex-situ (Botanical Garden, Seed Bank, Gene Bank and Cryopreservation).


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PORTIONS OF EVEN SEMESTER SYLLABUS ALLOTTED TO Dr. SHABAREE YASMEEN
A SANGMA.

SECOND SEMESTER

Paper 2 (Theory): Gymnosperms, Paleobotany, Morphology and anatomy

Unit 4:

1. Components of xylem and phloem with their functions.
2. Concept of primary and Secondary growth; Secondary growth in stem and root of dicots.
3. Anomalous secondary growth in Bignonia and Dracaena.

Paper 2 (Practical): Gymnosperms, Paleobotany, Morphology and anatomy

1. Study of vegetative and reproductive structures of all prescribed gymnosperms by preparing temporary stained slides (dissection, sectioning, drawing, description and identification upto genus.)
2. Study of fossils through slides and specimens.
3. Sectioning and observation of placentation types, ovule structure and anther through temporary preparations.
4. Study of permanent slide preparation by double staining techniques (Saffranin and Haemotoxylin or Saffranin and fast green).
5. Anatomical studies of anomalous secondary structures of Bignonia and Dracaena.
6. Spotting : Includes those groups and sections not covered in the preparations.

FOURTH SEMESTER

Paper 4 (Theory): Microbiology, Mycology and Plant Pathology

Unit 2:

1. Antibiotics: Types of antibiotics, history and mode of action.

Unit 3:

1. Classification of fungi according to Ainsworth
2. Life cycles of Erysiphe, Puccinia and Agaricus.


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SIXTH SEMESTER

Paper 8(Theory): Plant Reproductive Biology and Plant Biotechnology

Unit 3:

1. Cell and Tissue culture techniques.
2. Cellular differentiation and totipotency, organogenesis and embryogenesis.
3. Protoplast isolation and culture: Somatic hybridization and clonal propagation of elite plants (Shoot tips, axillary buds and meristem culture).
4. Production of haploid plants from anther, pollen and ovule.
5. Cryopreservation: Vitrification, artificial seeds.

Paper 8 (Practical): Plant Reproductive Biology and Plant Biotechnology (Practical)

1. Preparation of slides using acetolysis methods and study of pollen morphology.
2. Excision of endosperm and embryo.
3. Estimation of germination percentage of pollen grains using Brewbaker and Kwack's medium.
4. Study of pollen development, microsporogenesis, megasporogenesis, fertilization, endosperm and embryo using permanent slides.
5. Pollen staining using acetocarmine.
6. Preparation of tissue culture medium and inoculation of explants.


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PORTIONS OF EVEN SEMESTER SYLLABUS ALLOTTED TO SHRI MANMAN A SANGMA.

SECOND SEMESTER

Paper 2 (Theory) under NEP - FYUG**Unit 2 :**

1. Types of stamens and carpels

Unit 3 :

1. Organization of apical meristem.
2. Types of stomata in angiosperms
3. Root – stem transition

FOURTH SEMESTER

Paper 4 (Theory) Unit 3

1. Development of ascus and basidium
2. Range of vegetative structure and reproduction in fungi,
3. Economic importance of fungi
4. Growth forms, structure and economic importance of lichens

SIXTH SEMESTER

Paper 7 (Theory) Unit 4

1. Structure of B-DNA and RNA ; Secondary folding of tRNA
2. Mechanism of DNA replication; semi-conservative and semi-discontinuous replication.
3. Mechanism of transcription; Operon concept : inducible and repressible operons.
4. Recombination of bacteria (conjugation, transformation and transduction).
5. Mechanism of protein synthesis in prokaryotes.

Paper 7 (Practical)

1. Preparation of temporary slides of root tips and study of mitosis.
2. Study of cell division in flower buds and identification of meiotic stages,
3. Study of polytene chromosome through permanent slides.
4. Study of monohybrid and dihybrid ratios and their modifications by using Chi square test of significance.
5. Preparation of standard curve for estimation of :
 - a) DNA by Diphenylamine method
 - b) RNA by Orcinol method
6. Estimation of soluble proteins in plant materials by Bradford's method.
7. Emasculation, bagging, tagging and pollination in self-pollinated plants,


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PORTIONS OF ODD SEMESTER SYLLABUS ALLOTTED TO SHRI MANMAN A SANGMA.

FIRST SEMESTER

Paper 1 (Theory) under NEP - FYUG

Unit 1 :

1. Life cycles of Chara and Polysiphonia
2. Economic importance of algae

Paper 1 (Practical)

1. Study of vegetative and reproductive parts with the help of temporary slide preparations of all types of genera prescribed in Paper 1 (Theory).
2. Dissection ,sectioning, drawing ,description and identification of the specimens covered in the preparations.

THIRD SEMESTER

Paper 3 (Theory)

Unit 3

1. Study of economically important plants – cereals, pulses, oil-yielding, spices, condiments, fibres , ornamentals and aromatic (Scientific names, families and parts used of atleast three plants under each category).

FIFTH SEMESTER

Paper 5 (Theory)

Unit 3

1. Photoperiodism and Vernalization.
2. Physiological effects of auxins, gibberellins, ABA and cytokinins.
3. Seed dormancy and its regulation.
4. Physiology of senescence.

Paper 6 (Theory)

Unit 3

1. Functional attributes of ecosystem: Flow of energy (Box and Pipe Model), Ecological Pyramids, Primary Production (types and distribution), Food Chain and Food web.
2. Biogeochemical cycles : Hydrological cycles, Gaseous cycle (Carbon) and Sedimentary Cycle (Phosphorus).

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PORTIONS OF ODD SEMESTER SYLLABUS ALLOTTED TO SHRI MANMAN A SANGMA.

FIFTH SEMESTER

Paper 6 (Practical)

1. Determination of pH of soil samples of various sites using pH meter.
2. Determination of moisture content of two different soil samples using gravimetric method.
3. Determination of soil organic matter content of different soil samples by Walkley and Black's rapid titration method.
4. Determination of requisite size and requisite number of quadrats for the study of a plant community.
5. Determination of frequency, density, abundance, and basal area by quadrat method and IVI.
6. Study of morphological and anatomical features of xerophytes, hydrophytes, and epiphytes.
7. Study of spatial and temporal variations in climatic factors – light, temperature and relative humidity.


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SYLLABUS DISTRIBUTION: ODD SEMESTER
SHRI.DEBASISH R MARAK



Semester: I		Topic Distribution	Course Code : Bot-100 (Theory)	Year:2023-2024
Sl.no.	Unit	Topic of the Unit		
1	3	Salient features of Pteridophytes		
2	3	Classification of Pteridophytes by smith		
3	3	Types of Steler structures in Pteridophytes		

Semester: I		Topic Distribution	Course Code : Bot-100 (Practical)	Year:2023-2024
Sl.no.	Unit	Topic of the Unit		
1	4	Study of vegetative and reproductive parts with the help of temporary preparation of all genera prescribed in Paper BOT-100-T		
2	4	Dissection, Sectioning, drawing, description and identifications of the specimens covered in the preparations		
3	4	Spotting: Includes yhose specimen not covered in experiments 1 and 2		
4	4	Field visit to nearby areas to observe different group of plants prescribed in the theory syllabus		

Semester : III		Topic Distribution	Paper : III (Theory)
Sl.no.	Unit	Topic of the Unit	
1	1	Major system of classification	
2	1	Natural, Artificial, Phylogenetic system of Classification	
3	1	Bentham and Hooker system of Classification	
4	1	Hutchinson system of Classification	
5	1	International code of Nomenclature (ICN)	
6	1	Principles of Botanical Nomenclature	
7	1	Type method	
8	1	Typification	
9	1	Rules of Priority	
10	1	Limitation of Priority	


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Semester : V		Topic Distribution	Paper : VI (Theory)
Sl.no.	Unit	Topic of the Unit	
1	2	Population Ecology	
2	2	Attributes of Population	
3	2	Mortality, Natality, Survivorship Curve and population growth	
4	2	Population Interaction	
5	2	Types of Interaction Symbiosis	
6	2	Parasitism	
7	2	commensalism	
8	2	protocooperation	
9	2	competition	
10	2	Community Ecology	
11	2	Community structure	
12	2	Qualitative and Quantitative attributes of Community	
13	2	Quantitative attributes of Community	
14	2	Community dynamics	
15	2	Primary and secondary succession	
11.	2	Stages of Succession; Primary and Secondary	
12	2	Hydrosere	
13	2	Xerosere	

Semester : V		Topic Distribution	Paper : VI (Theory)
Sl.no.	Unit	Topic of the Unit	
1	1	Study of adaptational and morphological features of xerophytes, hydrophytes and epiphytes	
2	2	Determination of requisite size and requisite number of quadrats for the study of plant community	
3	2	Determination of frequency, density and abundance of study the plant community	
4	2	Determination of R.Dm, R.F., and R.D. by IVI - Procedure	
5	3	Field visit for collection of soil samples for ecology practical	
6	3	Determination of soil pH of soil samples of various sites using pH meter	
7	3	Determination of moisture content of two different soil samples by gravimetric method	
8	3	Determination of soil organic matter content of different soil samples by Walkley and Black's rapid titration method	
9	3	Study of spatial and temporal variations in climatic factors - light, temperature and relative humidity	


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SYLLABUS DISTRIBUTION: EVEN SEMESTER
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Semester: I I		Topic distribution	Course
Code:150 (Theory)			
Sl.no.	Unit	Topic of the Unit	
1	1	Geological Time Scale	
2	1	Fossil formation	
3	1	Plant fossil types	
4	2	Types of stipules	
5	2	Types of bracts	
6	2	Types of inflorescence	

Semester : IV		Topic Distribution	Paper : IV (Theory)
Sl.no.	Unit	Topic of the Unit	
1	4	Classification of Plant diseases	
2	4	Koch,s Postulate	
3	4	Host Parasite Interaction	
4	4	Pathogenecity	
5	4	Histological defence mechanism against infection	
6	4	Biochemical defence mechanism against infection	
7	4	Transmission of Plant diseases	
8	4	Dissemination of Diseases	


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Semester : VI		Topic Distribution	Paper : VIII (Theory)
Sl.no.	Unit	Topic of the Unit	
1	1	Microsporogenesis	
2		Microgametogenesis	
3	1	Pollen production and dispersion in time and space	
4	1	Pollen morphology and its role in taxonomy	
5	1	Pollen allergy	
6	2	Megaspороgenesis	
7		Megagametogenesis	
8	2	Fertilization	
9	2	Structure and function of synergids	
10	2	Development structure and function of endosperm and its haustoria	
11	2	Dicot embryogeny	
12		Suspensor	
13	2	Polyembryony	

Semester : VI (Practical)		Topic Distribution	Paper : VII
Sl.no.	Unit	Topic of the Unit	
1	1	Preparation of temporary slides of root tips and study of mitosis	
2	1	Study of cell division in flower buds and identification of meiotic stages	
3	1	Study of polytene chromosome through permanent slides	
4	1	Study of monohybrid and dihybrid ratios and their modifications by using Chi-square test of significance	
5	4	Preparation of standard curve for estimation of a) DNA by diphenylamine method b) RNA by orcinol method	
6	4	Estimation of soluble proteins in plant materials by Bradford method	
7	3	Emasculation, bagging, tagging and pollination in self pollinated plants	


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ODD SEMESTER SYLLABUS ALLOTTED TO
Dr. MANNA CHIBRA N. MARAK

FIRST SEMESTER

Paper 1 (Theory): Algae, Bryophytes and Pteridophytes

Unit 1:

1. Salient features of bryophytes and classification by Proskauer (1957).
2. Origin and range of gametophytic structures in Bryophytes.

Unit 2:

THIRD SEMESTER

Paper 3 (Theory): Angiosperm taxonomy, Economic Botany, Ethnobotany and Phytogeography

Unit 3:

1. Characteristics, cultivation and uses of aromatic and medicinal plants (*Citronella* and *Rauwolfia*).
2. Characteristics, cultivation and uses of timber yielding plants (Teak and Sal).

Paper 3 (Practical): Angiosperm taxonomy, Economic Botany, Ethnobotany and Phytogeography

1. Taxonomic studies of angiosperm plants belonging to both dicot and monocot families mentioned in paper 3. Flower dissection, drawing and description in technical language, and identification upto Genera.
2. Qualitative detection of starch, protein, fat and cellulose in plant materials by chemical tests.
3. Spotting: Economically important plants or plant products prescribed in paper 3.
4. Techniques for preparation of herbarium sheets of flowering plants and submission of at least 5 herbarium sheets.
5. Study of 5 plants having ethnobotanical importance.
6. One local fieldtrip of botanical relevance.

FIFTH SEMESTER

Paper 6: (Theory): Ecology and Conservation Biology

Unit 1:

1. Ecological Factors: Climatic (light, temperature, precipitation and fire), Edaphic (soil formation process, soil types, soil texture, soil profile, soil reaction and soil organic matter), Physiographic (slope and aspect of mountain) and Biotic (anthropogenic and non- anthropogenic) factors.

2. Ecological adaptations: hydrophytic, xerophytic, epiphytic and halophytic adaptations.
3. Ecological levels of organization: population, community, ecosystem, landscape, biome and biosphere.



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EVEN SEMESTER SYLLABUS ALLOTTED TO
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SECOND SEMESTER

Paper 2 (Theory): Gymnosperms, Paleobotany, Morphology and anatomy

Unit 2:

1. Floral morphology-Forms of calyx, corolla and aestivation; ovule forms and placentation
2. Leaf morphology-Phyllotaxy and venation.
3. Types of fruits, ovule forms, and placentation.
4. Types of seeds: albuminous and exalbuminous.

Paper 2 (Practical): Gymnosperms, Paleobotany, Morphology and anatomy

1. Study of vegetative and reproductive structures of all prescribed gymnosperms by preparing temporary stained slides (dissection, sectioning, drawing, description and identification upto genus.)
2. Study of fossils through slides and specimens.
3. Sectioning and observation of placentation types, ovule structure and anther through temporary preparations.
4. Study of permanent slide preparation by double staining techniques (Saffranin and Haematoxylin or Saffranin and fast green).
5. Anatomical studies of anomalous secondary structures of Bignonia and Dracaena.
6. Spotting: Includes those groups and sections not covered in the preparations.

FOURTH SEMESTER

Paper 4 (Theory): Microbiology, Mycology and Plant Pathology

Unit 2:

1. Different groups of micro-organisms in soil, their role in decomposition of organic matter and in Nitrogen fixation.
2. Sewage treatment.
3. Basic Concept of food spoilage and food poisoning. Microbes in milk and milk products.

Paper 4 (Practical): Microbiology, Mycology and Plant Pathology

1. Calibration of microscope and measurement of microbial spores (fungal and bacterial).
2. Demonstration of fungal or bacterial population density(spores)using haemocytometer.
3. Study of gram positive and gram-negative bacteria (leguminous root nodules and curd).


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4. Study of the vegetative and reproductive parts of the specimens prescribed in Unit 3 of Paper 4 with the help of temporary preparations. Sectioning, drawing, description and identification and classification of the specimens.
5. Study of the diseased specimens prescribed in Unit 4 of Paper 4 by temporary preparations and permanent slides.
6. Collection, Identification and submission of at least 5 diseased plant specimens.

SIXTH SEMESTER

Paper 7 (Theory): Genetics, Plant Breeding and Molecular Biology

Unit 1:

1. Mitosis and Meiosis, and their significance.
2. General account of structure of chromosomes and their role in inheritance; Chromosomal theory of inheritance.
3. Mendel's laws of inheritance, Alleles and multiple alleles.
4. Gene interaction (epistasis, supplementary, complementary and duplicate genes).

Unit 3:

1. Principles of crop improvement: domestication, introduction, hybridization and artificial selection.

Paper 8 (Theory): Plant Reproductive Biology and Plant Biotechnology

Unit 1:

1. Pollination mechanisms; Pollen pistil interaction and self-incompatibility.


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