TAMIL NADU OPEN UNIVERSITY

Syllabus and Regulations

M.Sc. Botany (Non Semester)

(Academic Year 2020-21 onwards)

Department of Botany

School of Science

Saidapet, Chennai – 600 015

Tamil Nadu, INDIA.

Master of Science in Botany

Regulations (Non Semester)

1. Objective of the Programme

Plant sciences is now an amalgamation of basic and applied science. Plants besides being the The unique capability of plants to trap solar energy and provide food to all cannot be replicated by any system. Conventional studies like plant identification is now being supplemented with molecular techniques like DNA Barcoding. The courses have been designed to benefit all Botany students to study various aspects of plant science including its practical applications. Keeping in mind that these students can take up teaching at different levels, research work in research institutes and or industry, doctoral work, environment impact assessment, biodiversity studies, entrepreneurship, scientific writing relevant topics have been included in the curriculum.

2. Programme Outcomes

1. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at ideas and decisions (intellectual, organisational, and personal) from different perspectives.
2. Analytical Skill: To analyse from various branches of knowledge and arrive at independent conclusions.
3. Effective Communication: Communicate and comprehend clearly in person and through electronic media in English and to make meaning of the world by connecting people, ideas, books, media and technology.
4. Social Responsibility: To be conscious of the society and it's requirement, and contribute towards it.
5. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
6. Ethics & Morals: Recognize different value systems, understand the moral dimensions of decisions, and accept responsibility for them.
7. Environment and Sustainability: Understand the issues of environmental contexts and

sustainable development.

8. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life- long learning in the broadest context of socio-technological changes.

3. Programme Specific Outcomes – M.Sc., Botany

1. Understanding the Scientific paradigm and its foundational philosophical principles.
2. Understanding the fundamental structure of Botany.
3. It enhances skills in handling scientific instruments, planning and executing biological research.
4. It also Promotes creative and novel ideas in biological concepts.
5. It provides Entrepreneurship skill development.

4. Eligibility:

A candidate who has passed B.Sc., degree in Botany/Plant Science/Biotechnology/Microbiology/Biochemistry as the main subject in part - III of any affiliated Institution/University accepted by syndicate shall be permitted to admission for M.Sc., Botany programme of this University.

5. Medium: English

6. Duration of the Course:

The course for the degree of Master of Science in Botany shall consist of two years.

7. Admission

The candidate's admission for the degree of Master of Science in Botany will be taken in academic year only.

8. Course of Study

The course of study shall comprise the instruction in the following subjects according to the syllabus.

I Year	**5 Major papers, 1 Practical** 1. Plant Diversity - I 2. Plant Diversity - II 3. Microbiology Immunology and Plant Pathology 4. Morphology, Plant Anatomy and Embryology

	5. Plant Taxonomy and Economic Botany 6. Practical - I
II Year	**5 Major papers, 1 Practical** 1. Cell and Molecular Biology 2. Plant Physiology 3. Plant Genetics, Plant Breeding and Biostatistics 4. Plant Ecology, Forestry and Evolution 5. Biochemistry, Plant Biotechnology and Bioinformatics 6. Practical - II

9. Examinations:

Theory Examinations: The theory examinations shall be three hours duration to each paper at the end of each year.The candidates who failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.

Practical Examinations: The practical examinations shall be three hours duration and the examinations should be conducted at the end of year.Compulsory record should be submitted at the time of practical examination.

10. Scheme of Examinations:

The scheme of examinations for two years shall be as follows:

Tamil Nadu Open University

School of Science

Department of Botany

M.Sc., Botany Structure (Non - Semester)

Year	Paper/Code	Title	Mark Distribution Int. + External	Max. Mark	Credits
1st year	Paper 1 MBOTN11	Plant Diversity– I (Algae, Fungi, Lichens and Bryophytes)	30+70	100	6
	Paper 2 MBOTN12	Plant Diversity – II (Pteridophytes, Gymnosperms	30+70	100	6

		and Palaeobotany)			
	Paper 3 MBOTN13	Microbiology, Immunology and Plant Pathology	30+70	100	6
	Paper 4 MBOTN14	Morphology, Plant Anatomy and Embryology	30+70	100	6
	Paper 5 MBOTN15	Plant Taxonomy and Economic Botany	30+70	100	6
	Paper 6 MBOTN 1P	Practical – I	30+70	100	4
2nd year	Paper 1 MBOTN21	Cell and Molecular Biology	30+70	100	6
	Paper 2 MBOTN22	Plant Physiology	30+70	100	6
	Paper 3 MBOTN23	Plant Genetics, Plant Breeding and Biostatistics	30+70	100	6
	Paper 4 MBOTN24	Plant Ecology, Forestry and Evolution	30+70	100	6
	Paper 5 MBOTN25	Biochemistry, plant Biotechnology and Bioinformatics	30+70	100	6
	Paper 6 MBOTN2P	Practical – II	30+70	100	4
				1200	**68**

11. Question Pattern for Theory Examinations:

Blue Print of the question paper

Max. Marks: 70 Passing Minimum: 40% Time: 3 hours

PART - A (5× 2 = 10 marks)
Answer ALL the questions

1. From Unit - I
2. From Unit - II
3. From Unit - III
4. From Unit - IV
5. From Unit - V

PART - B (4× 5 = 20 marks)
Answer any FOUR questions out of Seven questions in 150 words
All questions carry equal marks

6. From Unit - I
7. From Unit - II

8. From Unit - III
9. From Unit - IV
10. From Unit – V
11. From any unit
12. From any unit

PART - C (4 × 10 = 40 marks)
Answer any Four questions out of Seven questions in 500 words.
All questions carry equal marks.

13. From Unit - I
14. From Unit - II
15. From Unit - III
16. From Unit - IV
17. From Unit - V
18. From any unit
19. From any unit

Practical: (External only)

Time: 3 hours Max.marks:100

1. Major question – system/experiment - 35 marks
2. Minor question – analysis/mounting/experiment - 15 marks
3. Spotters (5 only) (5 x 6) - 30 marks
4. Record note book (Herbarium) - 20 marks

12. Passing Minimum

Passing Minimum for PG

For theory examination: The candidate shall be declared to have passed the examination if the candidate secures not less than 32 marks in the Term End Examinations (TEE) in each theory paper and secures not less than 13 marks in the Continuous Internal Assessment(CIA)and overall aggregated marks is 50 in both the external and internal taken together.

Continuous Internal	Term End Examination (TEE)	Overall	Maximum Marks

Assessment (CIA)				Aggregated Marks	
Minimum Pass Mark	Maximum Mark	Minimum Pass Mark	Maximum Mark	CIA + TEE	
13	30	32	70	50	100

For practical examination:The candidate shall be declared to have passed the examination if the candidate secures not less than 40 marks in the University practical examination and the mark distributions on results, record note book, procedure writing and Vivo-voce taken together is required to pass the examinations.

13. Classification of Successful Candidates:

Candidates who pass all the courses prescribed and who secure 60% and above in the aggregate of marks in Core courses will be placed in the First Class. Those securing 50% and above but below 60% in the aggregated will be placed in the Second Class.

Programme Outcomes

PO 1. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at ideas and decisions (intellectual, organisational, and personal) from different perspectives.

PO 2. Analytical Skill: To analyse from various branches of knowledge and arrive at independent conclusions.

PO 3. Effective Communication: Communicate and comprehend clearly in person and through electronic media in English and to make meaning of the world by connecting people, ideas, books, media and technology.

PO 4. Social Responsibility: To be conscious of the society and it's requirement, and contribute towards it.

PO 5. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO 6. Ethics & Morals: Recognize different value systems, ability to express the moral dimensions of decisions, and accept responsibility for them.

PO 7. Environment and Sustainability: evaluate the issues of environmental contexts and sustainable development.

PO 8. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life- long learning in the broadest context of socio-technological changes.

Programme Specific Outcomes – M.Sc., Botany

PSO1. Describibing the Scientific paradigm and its foundational philosophical principles.

PSO2. Recognize the fundamental structure of Botany.

PSO3. It enhances skills in handling scientific instruments, planning and executing biological research.

PSO4. It also Promotes creative and novel ideas in biological concepts.

PSO5. It provides Entrepreneurship skill development.

Tamil Nadu Open University

School of Sciences

Department of Botany

Chennai – 15

M.Sc., Botany - Syllabus – I year (Distance Mode)

Course Title	**: Plant Diversity - I**
Course Code	**: MBOTN 11**
Course Credit	**: 6 credits**

Course Objective:

CO 1. To evaluate the life of lower plants

CO 2. To analyze the values and importance of marine and terrestrial vegetation.

Course Outcome:

CLO1. The students will have overview and analyze the structure and relationship of various forms of cryptogams.

CLO2. To observe the reproductive cycle of non flowering plants

CLO3. To evaluate the evolutionary trends among non flowering plants.

CLO4. Identify the application aspects of statistical methods

Block I: Algae

1.1 Classification of Algae

1.2 Comparative Study

1.3 EonomicImporyance of Algae

Block II – Algae – Type study

2.1 Volvax

2.2 Chlorella

2.3 Nostoc

*2.*4 Oscillatoria

2.5 Batrocospermum

2.6 Polysiphonia

Block III: Fungi

3.1 General Classification

3.2 Salient Features

3.3 Host-Parasite Interaction

3.4 Heterothallism

3.5 Economic Importance of Fungi

3.6 Mushroom Cultivation

3.7 Cercospora

3.8 Polyporus

3.9 Phytopthora

3.10 Rhizopus

Block IV: Lichens

4.1 Introduction

4.2 Classification

4.3 Thallus Organization

4.4 Reproduction

4.5 Pollution Indicators

4.6 Economic Importance

3.7 Mycorrhizae

Block V: Bryophyte

5.1 Introduction to Bryophytes

5.2 General Classification

5.3 Reproduction and dispersal

5.4 Economic Importance of Bryophytes

5.5 Type Study Marchantia, Anthoceros, Porella, Poganatum.

Books for Reference:

1. Fritsch, F.E., 1935-45, The structure and reproduction of Algae. Cambridge University Press UK Vol. I & II

2. Smith, G.M., 1955, Cryptogamic Botany, Vol. I, Tata McGraw Hill book Co., N.Delhi.

3. Chapman, V.J. & Chapman, D.J., 1973, The Algae- 2nd edition Edward Arnold, London.
4. Alexopoulus C.J., Mims C.W., and Black Well M., 1996, Introductory Mycology, John Wiley and sons INC. Singapore.
5. Webster J., 1991, Introduction to Fungi.
6. VashistaSinha B.R., Singh, V.P., 2002, Botany for Degree students, Algae 9th revised edition,
S. Chand & Company Ltd., New Delhi.
7. Chopra G.L., A Text book of Fungi, S.Nagin& Co. Meerut, India
8. Smith, G.M., 1955, Cryptogamic Botany Vol. I & II, McGraw Hill Company

Web links

1. https://www.britannica.com/science/algae/Ecological-and-commercial-importance
2. https://naturalhistory.si.edu/research/botany/research/algae/algae-classification
3. https://organismalbio.biosci.gatech.edu/biodiversity/fungi-2/
4. https://www.britannica.com/science/lichen
5. https://www.worldatlas.com/articles/what-is-the-economic-importance-of-algae.html

Course Title: Plant Diversity - II

Course Code: MBOTN 12

Course Credit: 6 credits

(Pteridophytes, Gymnosperms and Palaeobotany)

Course Objective:

CO1. To list out plants under vascular cryprogams.

CO2. To illustrate the members of Pteridophyte

CO3. To interpret Salient features of Gymnosperms

CO4. To correlate the geological time scale with plants and animals

CO5. To appraise and anticipate the fossilization and fossil plants

Course Outcome:

CLO1. Ability ro compare and define General characters, morphology, reproductive organs, classification and economic importance of Pteridophytes.

CLO2. Students will be conversant with general characters, morphology and anatomy of Cycas, Pinus, Podocarpus, Araucaria, Ephedra and Gnetum.

CLO3. Able to formulate and anticipate the fossilization.

CLO4. Student gets knowledge in the methods of fossil and fossilization.

Block I: Pteridophytes

1.1 Pteridophytes General Introduction

1.2 General Classification

1.3 Reproduction

1.4 Origin of Seed Habit

1.5 Economic Importance of Pteridophytes

1.6 Type Study

Block II: Gymnosperms – salient features

1.1 General Introduction

1.2 Reproduction

1.3 Origin of Gymnosperms

1.4 General Classification

1.5 General Account

Block III: Gymnosperms – type study

3.1 Araucaria

3.2 Podocarpus

3.3 Ginkgo

3.4 Ephedra

Block IV: Palaeobotany – History and Origin

4.1 Concept of Palaeobotany

4.2 Diversification of Land Plants

4.3 Origin of Flowering Plants

4.4 Adaptations

4.5 Geological Time Scale

Block V: Palaeobotany – Classifiation

5.1 Classification of Fossils

5.2 Coalballs

5.3 Fossil Fuels

5.4 Fossil – Rhynia

Books for Reference:

1. Vashista, P.C., 1976, Botany for Degree Students Vol. V (Gymnosperms) S.Chand& Co. New Delhi.
2. S. P. Bhatnagar, AlokMoitra, Gymnosperms, New Age International, 1996.
3. Sukla& Mishra, S.P., 1982, Essentials of Palaeobotany, Vikas Publishing House
4. Arnold, C.A., 1947, An Introduction to Palaeobotany, McGraw Hill Publisher.
5. ChhayaBiswas and B.M. Johri., 2013. The Gymnosperms, Springer Science & Business Media.

Web links

1. **https://www.vedantu.com/biology/pteridophytes**
2. **https://plantlet.org/classification-of-pteridophytes/**
3. **https://www.thoughtco.com/what-are-gymnosperms-4164250**
4. **https://www.embibe.com/exams/gymnosperms/**
5. **https://palaeobotany.org/**

Course Title: Microbiology, Immunology and Plant Pathology

Course Code: MBOTN 13

Course Credit: 6 credits

Course Objective:

CO1. To describe and visualize the microorganism and its structures

CO2. To classify and compare the value and importance of microbes

CO3. To Distinguish and illustrate the structure and functions of virus

CO4. To identify and indicate the immune system and immunoglobuliins.

Course Outcome:

CLO1. The students will reach out the idea of the diversity of microbes.

CLO.2 Student will learn the potentialities of microbes enhancing human welfare

CLO3. Student be enlightened about the role of microbes in ecological balancing of nature

CLO4. Student can distinguish bacteria and virus

CLO5. Can compose and formulate the economic importance of microbes.

Block I: General Microbiology

1.2 Introduction

1.3 History and Concepts of Microbiology

1.3 History of Microniology

1.4 Classification

1.5 Ultra Stricture of Cell Wall

1.6 Bacterial Staining

1.7 Bacterial Reproduction

Block II: Applied Microbiology

2.1 Spoilage of Food

2.2 Fermented Products

2.3 Microbes in sewage treatment

2.4 Role of Mirobes in Agriculture

2.5 Mycotoxins

2.6 Industrial Applications

Block III: General Virology

3.1 History of Viruses

3.2 Classification of Virus

3.3 Structure of Viruses

3.4 Transmission of Virus

3.5 Isolation of Virus

3.6 Life cycle of Virus

3.7 Medicinal Importance of Virus

3.8 Special Study

Block IV: Immunology

4.1 Introduction

4.2 Immunity

4.3 Immune System

4.4 The Immune Response

4.5 Immunoglobulins

4.6 Antigen –Antibody Reaction

Block V: Plant Pathology

5.1 History, scope and significance of Plant Pathology –

5.2 Principles of plant infection – inoculum potential – infection and dissemination of pathogens. Causal agents of plant diseases - biotic causes (fungi, bacteria virus, mycoplasma, nematodes, parasitic algae, angiospermic parasites - Abiotic causes (Physiological, deficiency of nutrients & minerals and pollution). Koch's postulates - Symptoms of plant diseases.

5.3 Host – parasite interactions (Physiology of parasitism): Pathogenesis & Disease development, Role of enzymes and toxins in disease development.

5.3 Defense mechanisms: Host defense (Structural and Biochemical defenses). Process of infection – Mechanical, physiological and enzymatic action - Penetration and entry of pathogens into host tissues - Spread and transmission of plant diseases – wind, water, seed & vector borne. Genetics of plant disease:

5.5 Disease resistance – Genetics of virulence and resistance, Gene-for-gene concept, Techniques in plant breeding for disease resistance. Genetics of host – parasite interaction –

mutation, heterokaryosis, parasexual recombination. Techniques in Plant Pathology: Detection of pathogens in host tissues – ELISA –

5.6 Methods for incorporation of resistant genes – Electroporation – *Agrobacterium* mediated transformation. Important diseases of crop plants in India (Blast, sheath blight and bacterial blight of rice, anthracnose of cereals, wilt of cotton, rust of groundnut, red rot of sugar cane, yellow vein mosaic in okra, little leaf of brinjal).

Books for Reference:

1. Pelczar, Chan and Krieg, 1986, Essentials of Microbiology
2. Dube, H., 1978, A text book of Fungi, Bacteria and Virus. Vikas Publishers.
3. Prescott's Microbiology, by **Joanne Willey, Linda Sherwood and Christopher J. Woolverton**9th Edition
4. Brock Biology of Microorganisms, 14th Edition by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Daniel H. Buckley, David A. Stahl and Thomas Brock
5. Immunology by Thomas J. Kindt, 2002.
6. Cellular and Molecular Immunology by Abul K. Abbas 1991.
7. Agrios, A.G. 2007. Plant Pathology, Elsevier. **ISBN:** 9780120445653.
8. Singh, R.S. 2018. Introduction to Principles of Plant Pathology, 4th Edition.
9. Mehrotra, R.S. and Aggarwal, A. 2017. Plant Pathology.McGraw Hill Publisher.
10. Chaube, H.S. and Singh, R. 2015. Introductory Plant Pathology CBS Publishers, ISBN: 978-8123926704.
11. Ravi Chandra, N.G. 2013. Fundamentals of Plant Pathology, Phi Learning, ISBN: 812034703X.

Web links

1. **https://www.britannica.com/science/microbiology**
2. **https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Boundless)/1%3A_Introduction_to_Microbiology**
3. **https://conductscience.com/introduction-and-importance-of-microbiology/**
4. **https://aacijournal.biomedcentral.com/articles/10.1186/1710-1492-7-S1-S1**
5. **https://wholisticmatters.com/immune-system-support-stress-management/?utm_source=google&utm_medium=cpc&utm_campaign=immune&**

utm_content=3#seasons&gclid=CjwKCAjwh4ObBhAzEiwAHzZYU25jWUc9QTUTkYQKyx6dTN__hAQJf3FnHGgzWTaMfscfwV-RsqHknBoCL9QQAvD_BwE

6. **https://wholisticmatters.com/immune-system-support-stress-management/?utm_source=google&utm_medium=cpc&utm_campaign=immune&utm_content=3#seasons&gclid=CjwKCAjwzY2bBhB6EiwAPpUpZsh5c67Y7qSdPTvnS7L_qWKDm8K-hQ18J8bxMV2cJV0vl92i5_euZRoCCjYQAvD_BwE**

Course Title: Morphology, Plant Anatomy and Embryology

Course Code: MBOTN14

Course credit: 6 credits

Course Objective

CO1. To define and list out the different morphology of plant parts.

CO2. To describe and differentiae the modification of plant parts

CO3. TO explain the internal structure of plant parts

CO4. To compare the secondary gowth of root and stem of a plant

CO5. To describe the reproductive system in flowering plants

Course Outcome

CLO1. The students will gain ability to apply the acquired knowledge and skills in the field of plant morphology

CLO2. Student able to illustrate and interpret internal structure of plant parts

CLO3. Able to paraphrase the internal parts of tissues.

CLO4. They gain persuade the rules of generative and vegetative plant multiplication.

CLO5. The students are enabled to explain the plant reproduction organs of flowering plants.

Block I: Morphology

1.1 Leaf: Phyllotaxy, simple, compound and modifications;

1.2 inflorescence-types; Flower: description of floral parts;

1.2 Fruits-types.

Block I Theories of Meristem

2.1 Introduction

2.2 Meristem

2.3 Plant Tissue Classification

2.4 Dermal Tissue System

2.5 Ground tissue system

2.6 Vascular system

2.7 Secretary Tissues

Block II Root and Stem Anatomy

3.1 Root

3.2 Stem

3.3 Secondary Growth

3.4 Origin Lateral Roots

3.5 Formation of Adventitious Roots

3.6 Dendrochronology

Block IIILeaf Anatomy

4.1 Introduction

4.2 Internal Structure of Leaf

4.3 Nodal Anatomy

4.4 Periderm

Block IV Embryogenesis, Pollination and Fertilization

5.1 Introduction

5.2 Androecium

5.3 Gynoecium

5.4 Structure of Ovule

5.5 Megasporogenesis

5.6 Pollination

5.7 Fertilization

5.8Embryogeny

5.9 Embryo rescue

Books for Reference

1. Esau, K., 1975, Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.

2. Maheswari, P., 1971, An introduction to Embryology of Angiosperms, Tata McGraw Hill Publishing Co.Ltd, New Delhi.

3. Vasishta, P.C., A Text Book of Plant Anatomy, Pradeep Publications, Jullunder.

4. Bhojwani, S.S. and Bhatnagar, S.P., 1978, The embryology of Angiosperms, publishing House, N.Delhi.

5. Parihar, N.S., 1967, An introduction to Embryophyta Vol. II –Central Book depot, Allahabad

Web links

1. https://www.encyclopedia.com/social-sciences/applied-and-social-sciences-magazines/plant-anatomy
2. https://agriculturistmusa.com/plant-embryology/
3. http://www.ppup.ac.in/download/econtent/pdf/JNL%20College%20(%20Pallavi%20for%20Botany%20B.Sc%20Part%20II)%20Topic-Plant%20embryology%20part%201.pdf
4. https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_Biology_(Kimball)/16%3A_The_Anatomy_and_Physiology_of_Plants
5. https://kpu.pressbooks.pub/plant-identification/chapter/introduction-to-plant-morphology/

Course Title: Plant Taxonomy and Economic Botany

Course Code: MBOTN15

Course credit: 6 credits

Course Objective

CO1. To tabulate the principles of taxonomy

CO2. To label or state the binomial nomenclature

CO3. To recognize and reproduce botanical names of plant

CO4. To list the comically important plants

CO5. To identify the origin of crops at particular

Course Outcome

CLO1. The students are able to summarize Plant taxonomy
CLO2. Student can be able to describe systematic classification systems
CLO3. Students are able to analyze modern approaches in taxonomic studies.
CLO4. To be enlightened about the role of taxonomy in conservation of biodiversity
CLO5. Student can be able to construct the importance of plants

Block I: TAXONOMY – HISTORY and CLASSIFICATION

1.1 Introduction
1.2 Principles of Taxonomy
1.3 Theories of Taxonomy
2.1 Classification of Flowering Plants
- 2.1.1 Types of Botanical Classification
- 2.1.2 Bentham and Hooker
- 2.1.3 Engler and Prantl

Block II: TAXONOMY - CODES

2.1 ICBN
2.2 Rules

Block III: TAXONOMY – APPLICATIONS

3.1 Botanical Survey of India
3.2 KEW Garden London
3.3 Monographs
3.4 Cladistics
3.5 Dendrogram
3.6 Molecular Taxonomy
3.7 Serotaxanomy
3.8 Numerical Taxonomy
4.9 Herbarium

Block IV: TAXONOMY – FAMILY DESCRIPTION

1. Annonaeae
2. Meliaceae
3. Cucurbitaceae
4. Nyctaginaceae
5. Sapotaceae
6. Apiaceae
7. Verbenaceae
8. Poaceae
9. Cyperaceae
10. Orchidaceae
11. Moraceae
12. Menispermaceae
13. Asclepiadaceae
14. Aracaceae,
15. Liliaceae

Block V: Economic Botany

5.1 General account on economic botany – Cultivation and utilization of selected crop plants – Cereals (rice, maize and wheat) –

Pulses (green gram, red gram and black gram)

Sugar yielding plants (sugarcane and sugar beet) –

Spices and condiments (cardamom, cinnamon)

5.2 Commercial crops – Fibre (jute and manila hemp), Timber (Teak and red sanders wood)

Resins and gums (*Asafoetida* and gum arabic) –

5.3 Essential oils (lemon grass, eucalyptus and menthol)

Beverages (tea, coffee and cocoa) - Oil yielding plants (Groundnut, coconut,gingelly and sunflower,) –

5.4 Drug yielding plants *(Cinchona, Coleus, Rawolfia, Withania*and*Gloriosa).*

Books for Reference:

1. Rendle, R.B., The Classification of flowering plants, Vol. I, II &III, Oxford-Clarendon.

2. Vasisha, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company

3. Sharma, O.P., 1993, Plant Taxonomy, Tata McGraw Hill.

4. Sambamurty, S.S, Taxonomy of Angiosperms. I K International Publishing House.2005.

5. Tod F. Stuessy., 2009. Plant Taxonomy, Columbia University Press.

6. David M. Spooner., 2003. Plant Nomenclature and Taxonomy.John Wiley & Sons, Inc.

7. Sambamurty, A.V.S.S. and Subramanium, N.S. 2016. A textbook of modern economic Botany, CBS Publishers.

8. Pandey, P.B. 2017. Textbook of Botany: Angiosperms-Taxonomy, Anatomy, Economic Botany and Embryology. Chand Publishing, New Delhi.

Web link

1. https://www.botanicalartandartists.com/plant-evolution-and-taxonomy.html
2. https://open.lib.umn.edu/horticulture/chapter/2-1-plant-taxonomy/
3. https://botanicalsociety.org.za/the-science-of-names-an-introduction-to-plant-taxonomy/
4. https://www.employees.csbsju.edu/ssaupe/biol308/Lecture/introduction.htm
5. https://botany.org/home/resources/plant-talking-points/what-is-economic-botany.html

Course Title: Practical – I

Course Code: MBOTN 1P

Course Credit: 4 credits

Course Objective

CO1. To explain the live of lower plants practically

CO2. To identify the higher plants by seeing and visualizing the plant parts especially the flowers and inflorescence

CO3. To elaborate the functions and structures of higher plants

CO4. To describe the structure and mode of action by the mcrobes under microscopy and biochemical tests.

Course Outcome:

CLO1. Develop the skill for micro slide preparation and distinguish the internal structure of algae, fungi and bryophytes.

CLO2. To get acquire knowledge in secondary thickening dicot stem and anomalous secondary thickening in the stems.

CLO3. Expertise in media preparation, sterilization, isolation and identification of microbes.

CLO4. Develop skill on isolation of rhizobium from root module and acquire knowledge in methylene blue reduction test.

CLO5. Differentiate the internal structural variation of pteridophytes and gymnosperms through T.S and L.S.

CLO6. Can able to describe the importance of fossil forms and interprets it's geological type scale.

Major Practical:

1. Plant Identification
2. Bacterial staining
3. Isolation of microbes from soil and water
4. Measurement of stomatal index and frequency.

Minor Practical:

1. Lower plant Sectioning
2. Dichotomous key
3. Blood group determination
4. Embryo separation from plant Flower

Spotters:

1. Algae Slides
2. Microbes Slides
3. Fungi Slides
4. Gymnosperms
5. Fossil
6. Plant Identification from Herbarium (One plant)
7. Slides of Anatomical structures
8. Slides of Embryological structures

Web links

1. https://courses.lumenlearning.com/bio2labs/chapter/fungi-lab/
2. https://www.britmycolsoc.org.uk/education/university/undergraduate-practicals
3. https://wcwc.ca/wp-content/uploads/2020/12/Algae-identification-lab-guide.pdf
4. https://www.easybiologyclass.com/similarities-and-differences-between-pteridophytes-and-gymnosperms/
5. https://www.academia.edu/33116487/PRACTICAL_6_BRYOPHYTES_AND_PTERIDOPHYTES
6. **https://www.ableweb.org/biologylabs/wp-content/uploads/volumes/vol-19/09-yeung/09-YEUNG.HTM**
7. **https://ncert.nic.in/textbook/pdf/kebo115.pdf**
8. https://www.gpgcraipur.ac.in/books/A%20Textbook%20of%20Practical%20Botany%20II-bsc.pdf
9. https://study.com/academy/lesson/what-is-economic-botany-definition-elements.html

M.Sc., Botany - Syllabus – II year (Distance Mode)

Course Title: Cell and Molecular Biology

Course Code: MBOTN 21

Course Credit: 6 credits

Course Objectives

CO1. To describe the overview of the cellular and molecular mechanism that governs plant development.
CO2. To explain the basic concepts and most recent scientific advances in the cell and molecular biology.
CO3. To infer the receptors, ligands and signal transduction pathway
CO4. To promote the students' abilities to correlate the concepts across different disciplines of Plant Science.

Course Outcomes

CLO1. Knowledge on the cellular and molecular level that govern plant development.
CLO2. To correlate various macromolecular components of cells and their functions.
CLO3.TO illustrate various levels of gene regulation and protein function including signal transduction and cell cycle control.
CLO4.To summarize the general principles of gene organization and expression.
CLO5.To explain the role or receptors and ligands in cell signalling.

Block I: Plant – The Cell

1.1 Introduction
1.2 Structure of Cell
1.3 Cell Cycle
1.4 Cell Division

Block II: Organelles

2.1 Introduction
2.2 Plastids Androecium
2.3 Mitochondria
2.4 Ribosomes
2.5 Chromosomes
2.6 Golgi body
2.7 Endoplasmic reticulum

2.8 Lysosomes
2.9 Peroxisomes
2.10 Vacuoles
2.11 Cilia and Flagella

Block III: The Nucleus

3.1 Nucleus
3.2 Cell Division

Block IV: Structure and Function of DNA

4.1 Introduction

4.2 Types of DNA

4.3 Structure of DNA

4.4 Genetic Information

4.5 Genetic Code

Block V: Gene Expression

5.1 Introduction

5.2 Regulation of Gene Expression in Prokaryotes

5.3 Regulation of Gene Expression in Eukaryotes

5.4 Transcription in Prokaryotes

5.5 Transcription in Eukaryotes

5.6 Translation in Prokaryotes

5.7 Translation in Eukaryotes

5.8 Stability of Messenger RNA (mRNA)

5.9 Splicing

5.10 Capping

5.11 Polyadenylation

5.12 mRNA Surveillance

Reference Books

1. Ajoy Paul, 2009. Text book of Cell and molecular biology, Books and Allied (p) Ltd Kolkata.
2. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter (2002). Molecular biology of the cell (IV Edition). Garland Science, Taylor and Francis group, New York.

3. Cooper, G.M. and Hausman, R.E. 2013. The Cell: A Molecular Approach. 6th Edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Smith, A, Coupland, G., Dolan, L., Harberd, N., Jones, J., Marting, C., Sablowski, R. and Amey, A. 2010. Plant Biology. Garland Science, Taylor and Francis Group.
5. Karp, G. 2018. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
6. Kumar, H.D. 2000. Molecular Biology. Vikas Publishing House Pvt. Ltd. New Delhi.
7. Verma, P.S. and Aggarwal, V.K. 2010. Molecular Biology, Chand Publishing, New Delhi.
8. Lewin, 2017. Gene XII. Jones and Barlett Pub. ISBN. O 7637 5222 3
9. Lodish, et al. 2016. Molecular and Cell Biology. W.H. Freeman & Co. New York.
10. Verma P.S. and Agarwal V.K. 2007.Cell biology, Genetics, molecular biology and evolution, S. Chand Publishing, New Delhi.
11. Buchanan, B., Gruissem, W. and Jones, R. 2000. Biochemistry & Molecular Biology of Plants by American Society of Plant Physiology, Rockville, MD,

Web link

1. https://plato.stanford.edu/entries/cell-biology/
2. https://education.nationalgeographic.org/resource/resource-library-cell-biology
3. https://www.cdc.gov/genomics/about/basics.htm
4. https://learn.genetics.utah.edu/content/basics/
5. https://www.nifa.usda.gov/topics/plant-breeding
6. https://plato.stanford.edu/entries/molecular-biology/
7. https://www.thermofisher.com/blog/ask-a-scientist/what-is-molecular-biology/
8. https://www.britannica.com/science/molecular-biology

Course Title: Plant Physiology

Course Code: MBOTN 22

Course Credit: 6 credits

Course Objectives:

CO1. To define the functions of tissues and cells of higher plants

CO2. To locate the transport of minerals and water in plant system

CO3. To interpret the metabolisms of plant systems

CO4. To state and visualize the biological clock and rhythms of plant system.

Course Outcome:

CLO1. The Students can explain about absorption, translocation and utilization of water and other minerals.

CLO2. Comprehend the changes during growth process (germination to abscission).

CLO3. Student can able to interpret energy flow and various metabolic cycles with their integration.

CLO4. Student can able to paraphrase the verall perception about various physiological processes occurring in plants.

Block I: Plant – Water Relation

1.1 Introduction

1.2 Importance of Water

1.3 Water Potential

1.4 Imbibition

1.5 Diffusion

1.6 Osmosis

1.7 Absorption of Water

1.8 Transpiration

1.9 Guttation

1.10 Ascent of Sap

1.11 Essential Mineral Elements

Block II: Photosynthesis

2.1 Introduction

2.2 Photosynthesis

2.3 Respiration

2.4 Photorespiration

Block III: Nitrogen Metabolism

3.1 Nitrogen metabolism

3.2 Ammonification and Nitrification

3.3 Nitrogen Fixation

3.4 Amino acids

3.5 Lipids

Block IV: Plant Growth Hormones

4.1 Introduction

4.2 Auxins

4.3 Cytokinins

4.4 Gibberellins

4.5 Ethylene

4.6 Abscisic acid

4.7 Phytochrome

Block V: Photoperiodism

5.1 Introduction

5.2 Photoperiodism

5.3 Vernalization

5.4 Ripening

5.5 Circardian Rhythms

5.6 Senescence

Books for Reference

1. Frank B. Salisbury and Celon W. Ross, Plant Physiology,GBS Publishers and distribution, New Delhi.

2. Jain, V.K., Plant Physiology, S.Chand& Company, N.Delhi.

3. Sinha, R.K., Modern Plant Physiology, Narosa Publishing House.

4. Lincoln Taiz, 2010. **Plants Physiologyand Development,** Sinauer Associates Inc.

5. Mukherjee . S, Ashim Kumar Ghosh. 2009. Plant Physiology, New Central Book Agency

Web link

1. https://study.com/academy/lesson/what-is-plant-physiology-definition-experiments.html
2. https://bio.libretexts.org/Bookshelves/Botany/Botany_(Ha_Morrow_and_Algiers)/Unit_3%3A_Plant_Physiology_and_Regulation
3. https://www.vedantu.com/biology/plant-physiology
4. https://www.lifeasible.com/custom-solutions/plant/analytical-services/plant-physiology-analysis/
5. https://learn.careers360.com/biology/plant-physiology-chapter/
6. https://www.geeksforgeeks.org/most-important-questions-on-plant-physiology/

Course Title: Plant Genetics Plant Breeding and Biostatistics

Course Code: MBOTN 23

Course Credit: 6 credits

Course Objectives

CO1. To lable the fundamental principles of Genetics,
CO2. To identifythe structure, function and changes in the genetic materials.
CO3. To visualize the principles of Plant Breeding and the application of molecular techniques in crop improvement.
CO4. To acquire skill on the comprehensive analysis of experimental data with statistical tools.
CO5. To develop laboratory skill one the analysis and interpretation of various biochemical and molecular biology experiments.
CO6. To train on basic computer knowledge to tabulate, analyse and interpret the data.

Course Outcomes

CLO1. Able to explain the fundamental principles of Genetics
CLO2. Student interpret the structure, function and changes in the genetic materials.
CLO3. Able to describe the different principles of plant breeding and the application of molecular genetics techniques in crop improvement.
CLO4. Aquire Skill for the statistical analysis of experimental data with software's.
CLO5. Aquire Laboratory skills for the analysis and interpretation of various biochemical and molecular biology experiments.
CLO6. Can interpret on basic computer application to tabulate, analyse and interpret the data.

Block I: Genetics

1.1 Introduction

1.2 History of Genetics

1.3 Mendelian Laws of Heredity

1.4 Linkage

1.5 Crossing over

1.6 Extra-chromosomal inheritance.

1.7 Cytoplasmic male sterility in plants

1.8 Chromosomal mapping

Block - II

2.1 Gene concept– Factor concept of Mendel, One gene -One enzyme hypothesis.

2.2 Benzer's concepts of Cistron, muton and recon.

2.3 Types and description of gene family (housekeeping genes, transpossons overlapping genes, pseudogenes, gene cluster).

2.4 Gene mutation- Molecular basis of mutation, physical and chemical mutagens and their mode of action.Detection of mutation by CLB and Muller methods – Biochemical mutants in bacteria and *Neurospora*.

Block III: Plant Breeding

3.1 Centers of origin of cultivated plants. Domestication syndrome in cultivated plants.

3.2 Plant breeding methods in self-fertilized, cross fertilized and vegetative propagated plants. Breeding plants for improving yield, quality and resistance to insect pests and diseases.

3.3 Plant breeding work in India with special reference to Rice, cotton and Sugarcane.

Role of polyploidy in plant improvement.Heterosis breeding with examples.

Application of induced mutations in crop improvement.

3.4 Role of molecular markers in plant breeding- RAPD, RFLP, VNTR, SSR and ISSR. Marker assisted selection and QTL mapping. Germplasm maintenance of rice and sugarcane.Role of IBPGR, Italy and NBPGR, New Delhi in germplasm conservation.

Block- IV: Biostatistics - Principles

4.1 Experimental designs: Principles - replication and randomization. Common designs in biological experiments: Completely randomized design, randomized block design and Latin square design.

4.2 Methods of data collection. Primary and secondary data, qualitative and quantitative data.Frequency distribution table construction.Graphical representation of data.

4.3 Measures of central tendency- Mean, Median and Mode. Measures of dispersion- Mean deviation, Standard deviation, variance, standard error and coefficient of variation.

Block – V Probability

5.1 Probability - Definition, mutually exclusive events, independent events. Theorems on probability.

5.2 Tests of statistical significance - Null hypothesis and alternate hypothesis. Significance level and level of confidence. t- test. Chi square test (goodness of fit, independence of qualitative

characters), F-test.Correlation and Regression. One way ANOVA, multiple mean comparison tests (DMRT, Tukey's test).

Books for reference

1. Allard, R.W. 2010. Principles of Plant Breeding (2nd Edition). John Wiley and Sons, Inc.
2. Benjamin A. Pierce, 2008. Genetics: A conceptual approach(4th Edition). W H Freeman and Company Ltd.
3. Brian, K.H. and Benedict, H. 2014. Evolution (5th Edition). Jones & Bartlett Publishers.
4. Daniel L. Hartl, 2017. Genetics: Analysis of genes and genomes(8th Edition). Jones and Bartlett Publishers.
5. David R. Hyde, 2010. Genetics and molecular biology (1st Edition). Tata-McGraw Hill.Gardner, E.J. 2019. Principles of Genetics, 8th Edition, Johan Wiley, New York.
6. Gupta, P.K., 2007, Genetics Classical to Modern, Rastogi Publications, Meerut.
7. William S Klug and Michael R Cummings, 2018. Concepts of Genetics(12th Edition). Pearson Education Pvt. Ltd., Singapore.
8. Chahal, G.S. and Gosal, S.S. 2002. Principles and procedures of Plant Breeding. Narosa Publishing House.
9. Allard, R.W. 2010. Principles of Plant Breeding (2nd Edition). John Wiley and Sons, Inc.
10. Prasad, 2011. Elements of Biostatistics – S. Rastogi Publications, Meerut.

Web link

1. https://www.cdc.gov/genomics/about/basics.htm
2. https://learn.genetics.utah.edu/content/basics/
3. https://www.nifa.usda.gov/topics/plant-breeding
4. https://www.healthcare-management-degree.net/faq/what-exactly-is-biostatistics/
5. https://sphweb.bumc.bu.edu/otlt/mph-modules/bs/bs704_biostatisticsbasics/bs704_biostatisticsbasics_print.html

Course Title: Plant Ecology, Forestry and Evolution

Course Code: MBOTN 24

Course Credit: 6 credits

Course Objective

CO1. To extend the knowledge of the environment and its interaction with the vegetation.

CO2. To explain the energy flow among the components of ecosystem

CO3. To generalise the forests and its acts

CO4. To devise the construction of forest by the sylviculture system.

Course Outcome

CLO1. The students will have the ability to estinate the importance of the local ecology, culture, history and economic development balanced with a social responsibility,

CLO2 .Student can able to explain the basic concepts of plant ecology and our surrounding ecosystem.

CLO3. To identify the natural resources which can be conserve for future and sustainable development.

CLO4. To construct awareness of conserving natural resources and maintaining the integrity of the indigenous culture.

Block I: Ecosystem

1.1 Introduction
1.2 Components of Ecosystem
1.3 Energy Flow
1.4 Biogeo Chemical Cycle

Block II: Ecological Adaptations

2.1 Categories of Adaptations
2.2 Hydrophytes
2.3 Xerophytes
2.4 Methods of studying Vegetation

Block III: Pollution

3.1 Air Pollution
3.2 Water Pollution

3.3 Thermal Pollution
3.4 Noise Pollution

Block IV: Forest types and Forest Utilization

4.1 Introduction
4.2 Types of Forests
4.3 Importance of Forests
4.2 Commercial Forestry
4.3 Agro Forestry
4.4 Silviculture

Block V: Evolution

5.1 Evolution: Darwin concept of variation, adaptation, struggle, fitness and natural selection.

5.2 The evolutionary synthesis. Origin of basic biological molecules,

Abiotic synthesis of organic monomers and polymers, Concept of Oparin and Haldane, Experiment of Miller.

5.3 The first cell. Origin of prokaryotic and eukaryotic cells. Evolution of unicellular eukaryotes.Concepts of neutral evolution, molecular divergence and molecular clocks – Micro and macro evolution.

5.4 Concept of Wallace and his contributions.

Books for Reference

1. Eugene P Odum, Fundamentals of Ecology, Nataraj Publishers

2. Sharma, P.D., Ecology &Envirnoment, Rastogi Publications.

3. S.S. Negi, Forestry, New Delhi.

4. Navjot S. Sodhi, Paul R. Ehrlich, 2010. Conservation Biology, Oxford University Press.

5. Oscar Galelio, 2014. Biodiversity: The Dynamic Balance of the Planet, InTech.

6. Burton V. Barnes, Donald R. Zak., 1998.Forest Ecology, John Wiley & Sons.

7. MaxtoshiNei and Sudhir Kumar, 2000.Molecular Evolution and phylogenetics.Oxford University Press.

8. Roderic, D., Page, M. and Holmes, E.C. 1998. Molecular Evolution: A phylogenetic approach. Blackwell Science Ltd.

9. Brian, K.H. and Benedict, H. 2014. Evolution (5th Edition).Jones & Bartlett Publishers.

Web link

1. https://www.esa.org/seeds/toolkits/forests/introduction-to-forestry/
2. https://www.britannica.com/science/forestry
3. https://agri-bsc.kkwagh.edu.in/uploads/department_course/FRST-121_Forerstry_notes.pdf
4. https://evolution.berkeley.edu/evolution-101/an-introduction-to-evolution/
5. https://bio.libretexts.org/Bookshelves/Botany/Botany_(Ha_Morrow_and_Algiers)/Unit_0%3A_Introduction_to_Botany/01%3A_Introduction/1.03%3A_Intro_to_Evolution
6. https://www.britannica.com/science/ecology
7. https://plato.stanford.edu/entries/ecology/

Course Title: Biochemistry Plant Biotechnology and Bioinformatics

Course Code: MBOTN 25

Course Credit: 6 credits

Course Objective

CO1. To record the fundamentals and significance of Plant Biochemistry.
CO2. To read the structure and properties of plant biomolecules.
CO3. To recognize the fundamental and applications of Plant Biotechnology.
CO4. To examine the structure, function and changes in the genetic materials.
CO5. To learn the principles of Plant Breeding and the application of molecular techniques in crop improvement.

Course Outcome:

CLO1. Able to explain the fundamentals and significance of Plant Biochemistry.
CLO2. Ability to describe the structure and properties of plant biomolecules.
CLO3. Can distinguish the production of hybrid plants through rDNA technology
CLO4. Can able to interpret the importance of differential regulation of gene expression plant systems.
CLO5. Able to infer the structure, function and changes in the genetic materials.
CLO6. Student can describe different principles of plant breeding and the application of molecular genetics techniques in crop improvement.

Block I: Basis of Biochemistry

1.1 Calorimetry

1.2 Buffer

1.3 Bonding

1.4 Isomerism

1.5 Carbohydrates

Block IV: Amino acids

2.1 Concepts of Amino acids

2.2 Proteins

2.3 Lipids

Block III: Enzymes

3.1 Enzymes

3.2 Classification of Enzymes

3.3 Mechanism of Enzyme Action

3.3 Factors affecting Enzymes

3.5 Enzyme Specificity

3.6 Enzyme Inhibition

3.7 Importance of Enzymes

Block IV: Genetic Engineering and Plant Biotechnology

3.1 Introduction

3.2 Strategies of Genetic Engineering

3.3 Hybridization

3.4 Application of Genetic Engineering

3.5 Types of Culture

3.6 Callus Culture

3.7 Protoplast Culture

3.8 Meristem Culture

Block V: Bioinformatics

5.1 Definitions and History of Bioinformatics. Computational Biology and Bioinformatics.

5.2 Applications and scope of Bioinformatics.

Biological databases- Types of data and databases, Nucleotide sequence database (EMBL, GENBANK, DDBJ)- Protein sequence database (PIR, SWISS-PROT, TrEMBEL), Secendary Databases (PROSITE, PRINTS, BLOCKS).

5.3 Information retrieval from databases – search concepts, tools for searching.

Books for Reference:

1. Bonner, J. and Warner, W.H. 1961. Plant Biochemistry. Academic Press. Inv. New York.
2. Gupta, S.N. 2016. Biochemistry Rastogi Publications, Meerut.
3. Satyanarayana, U. and Chakkrapani, U. 2013. Biochemistry. Elsevier India Pvt Ltd & Books Allied Pvt.Ltd, New Delhi.
4. Nelson, D.L. and Cox, M.M. 2017. Lehninger's Principles of Biochemistry, Prentice Hall, International N.J, 7th Edition.
5. Heldt, H-W. 2005. Plant Biochemistry, 3rd Edition. Elsevier Academic Press.
6. Buchanan, B.B., Grissem, W. and Jones, R.L. 2000. Biochemistry and molecular biology of plants. 5th Edition. Wiley-Blackwell.
7. Jain, J.L., Jain, S. and Jain, N. 2016. Fundamentals of Biochemistry. Chand Publishing, New Delhi.

8. Conn, E.E.,Stumpf,P.K.,Bruening,G. and Doi,R.H., Outlines of Biochemistry 5th edition,Wiley India Ltd.,N.Delhi.
9. Lehninger, L., Biochemistry, Kalyani Publishers, Ludhiana, N.Delhi.
10. LubertStrayer, Biochemistry, Freeman International Edition San Francisco
11. Primrose, S.B., 1987, Modern Biotechnology, Black well Scientific Publications, Oxford
12. Old, R.W. and Primrose, S.B., 1996, Principles of Gene manipulation – An introduction to Genetic Engineering, Black Well Scientific Publications, Oxford.
13. Mani, K. and Vijayaraj, N. 2002. Bioinformatics for Beginners. KalaikathirAchchagam, Coimbatore.
14. Lesk, A.M. 2002. Introduction to Bioinformatics, 1st Edition, Oxford University Press, Oxford, UK.
15. Rastogi, S.C. 2008. Bioinformatics: Methods and Applications Genomics, Proteomics and Drug Discovery.PHI Learning Pvt. Ltd.

Web link

1. https://www.mcgill.ca/biochemistry/about-us/information/biochemistry
2. https://biochemistry.org/education/careers/becoming-a-bioscientist/what-is-biochemistry/
3. https://www.britannica.com/science/biochemistry
4. **https://www.intechopen.com/chapters/40180**
5. **https://www.apsnet.org/edcenter/disimpactmngmnt/labexercises/PlantBiotechnology/Documents/PlantTissueCulture.pdf**
6. http://www.jaist.ac.jp/~bao/talks/IntroBioinformaticsE.pdf

Course Title: Practical – II

Course Code: MBOTN 2P

Course Credit: 4 credits

Course Objective:

CO1. To observe and identify the lower and higher plants by morphological anatomical and biochemical methods

CO2. To visualize the nature of metabolism and functions by experimental methods

CO3. To develop the biochemical interpretations by biochemical experiments

CO4. To estimate the various plant growth tests

Course Outcome:

CLO1. The laboratory courses help the student to explain the principles of laboratory.

CLO2. The Students enable to acquire the practical knowledge about determination, extraction estimation, preparation and measurement of various plant physiologicalexperiments/assay.

CLO3. The students will be able to process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.

CLO4. In biochemistry, the student gets practical knowledge in order to Preparation of molal, molar, normal and percentage solutions and their dilutions

CLO5. Practically students able to find out the ecological parameters such as plant species distribution, abundance and density in a defined area by quadrat method.

CLO6. Students will be able to gain knowledge on estimation of dissolved oxygen content, chloride content, carbonate and bicarbonate in water and total

CLO7. The students gain proficiency in laboratory technique and bio-instrumentation principle, and be able to apply theseinstrument mechanisms to the process of experimentation in future research field.

Major Practical:

1. Quantification of Proteins
2. DNA Isolation
3. Estimation of Sugars

4. Water analysis including pH, conductivity, salinity, total Hardness
5. Estimation of O2 Evolution from plant (Hydrilla)
6. Pigment estimation

Minor Practical:

1. Quadrate method/ Line transect Method
2. Sectioning of Plant parts (Shoot, Root and leaf)
3. Complementary color
4. Paper Chromatography
5. Preparation of mitotic and meiotic spreads and analysis of various stages of cell division (Allium)
6. Seed viability – Tetrazolium chloride test.

Spotters:

1. Organelles structure - Slides
2. Laws of Genetics
3. Calculation of gene frequencies
4. Cot curve
5. DNA melting curve
6. tertiary structure of protein
7. HIND III
8. pUC Plasmid

Weblink

1. https://biochemden.com/biochemical-techniques-basics/
2. https://www.bjcancer.org/Sites_OldFiles/_Library/UserFiles/pdf/Cell_Biology_Laboratory_Manual.pdf
3. https://www.britannica.com/science/molecular-biology
4. https://study.com/academy/lesson/what-is-plant-physiology-definition-experiments.html