Darrang College (Autonomous), Tezpur-784001

Syllabus for FYUGP

Subject: BOTANY

Course Type: SEC

2025-2026

Approved by:

Board of Studies meeting held on 24-12-2025

& Academic Council vide Resolution no. 2, dated- 29-12-2025

Botany

DARRANG COLLEGE (AUTONOMOUS), TEZPUR-784001

SYLLABUS FOR FYUGP B.SC. BOTANY

PREREQUISITE

FOR MAJOR IN BOTANY, A STUDENT MUST PASS IN BIOLOGY AT XII LEVEL.

FOUR-YEAR UNDERGRADUATE PROGRAMME (FYUGP) IN BOTANY, Darrang College (Autonomous)

INTRODUCTION :

Aim of FYUGP in Botany is designed with the following Objective

1. To build strong foundational knowledge in Plant Science through its various branches, like Morphology, Anatomy, Taxonomy, Pathology, Ecology, Cytology, Genetics, Molecular Biology and Biotechnology.
2. To emphasize regional Biodiversity, including Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperm and Angiosperms.
3. To develop skills for sustainable plants' resources and uses.
4. To foster critical thinking on environmental issues and prepare graduates for research or biological entrepreneurship.
5. Equipping students with theoretical knowledge and practical skills, covering modern and traditional botany.
6. T enhance the skill of conservation, agriculture, research and carriers in biotech, pharma and enviromental sectors.

Program Outcome:

On successesful completion of the FYUGP program , students will able to obtain:

1. Knowledge with the concept of different plant groups, viz. Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms including Viruses and Bacteria.
2. Knowledge of plant diversity, distribution, morphology and anatomy.
3. Knowledge of physiochemical propertiesof cells and their functions.
4. Fundamental knowledge for perform laboratory and field experiments and to prepare analysis of data and interpretation of results.
5. Knowledge of physiological processes , viz. metabolism, nutrition, plant-water relation, photosynthesis, respiration, growth and development, photoperidism etc.
6. Knowledge of systematic and taxonomic study of plants.
7. Knowledge of plants' diseases and their controls.
8. Knowledge of microbial diversity, their ecology and economic importance.
9. Knowledge of different biomolecules, viz. carbohydrates, fats-lipids, proteins, nucleic acid; their chemical nature and applications.
10. Knowledge of plant tissue cultures, genetic engineering, plant breeding techniques and their applications.
11. Applications and economic importance of various plant groups in industries, agricultures and medicine for human welfare.

Teaching-Learning Process

The key components of teaching-learning process in Botany for the Four-Year- Under

-Graduate Program (FYUGP) in Botany are:

1. Traditional Lectures: Provide foundational knowledge and theoritical instructions.

2. Tutorials: Provide more clearification/ concept of difficult topic. More applicable for slow learners in small groups.

3. Practical and Laboratory Works: Essential for developing hands-on- skills such as microscopy, slide preparation, specimen identification, harberium preparation and conservation and conducting experiments.

4. Field Studies/ Industrial Visits: Give opportunities to study plants in their natural habitats, explore local biodiversity and understand industrial processing of plant products.

5. Use of ICT Tools: Incorporates informations and communications Technology (ITC) tools, biological databases abd software to solve biological problems.

6. Project Work/ Dissertations: Fostering indipendent research works.

7. Group discussions and Seminers/ Workshops: Enhancing communication, critical thinking and team work skills.

Teaching-Learning Tools:

1. White board/Green board/Black board
2. LCD Projectors and Monitors
3. Smart boards
4. Demonstration models
5. Laboratory Equipments, viz. microscopes, spectrophotometer, centrifuge, autoclaves, pH meters, laminar air-flow etc.
6. Specimens and Slides.
7. Habarium Library.
8. Tissue Culture Laboratory
9. Shade house and Green house.
10. Mushroom cultivation room.
11. Botanical garden.

Assessment Methods:

Student progress is continuously evaluated through a combination of formative and summative assessment techniques, including:

1. Home assignments
2. Report based on projects, industry visits or field study
3. Seminer presentations.
4. In semester/sessional examinations (both theoritical and practical)
5. End semester examinations (both theory and practical)

FYUGP STRUCTURE

SEMESTER	TYPE	COURSE	COURSE CODE	CREDIT
1	Major	Major-1 (Plant and Microbial	BOT-MJ-01014	4

		Diversity)		
	*Minor	Minor-1 (Plant and Microbial Diversity)	BOT-MN-01014	4
	SEC	SEC-1 (Mushroom cultivation technique)	BOT-SEC-01013	3
2	Major	Major-2 (Cell Biology and Biomolecules)	BOT-MJ-02014	4
	Minor	Minor-2 (Cell Biology and Biomolecules)	BOT-MN-02014	4
	SEC	SEC-2 Biofertilizer	BOT-SEC-02013	3
*Here, the minor paper indicates the minor paper offered by the Department of Botany for the students other than Botany Major.				
3	Major	Major-3 (Laboratory and Field Techniques in Plant Science)	BOT-MJ-03014	4
		Major-4 (Plant Physiology)	BOT-MJ-03024	4
	*Minor	Minor-3 (Laboratory and Field Techniques in Plant Science)	BOT-MN-03014	4
	SEC	SEC-3 (Environmental Ethics)	BOT-SEC-03013	3
*Here, the minor paper indicates the minor paper offered by the Department of Botany for the students other than Botany Major.				
4	Major	Major-5 (Morphology and Anatomy of Angiosperms)	BOT-MJ-04014	4
		Major-6 (Mycology and Phytopathology)	BOT-MJ-04024	4
		Major-7 (Microbiology)	BOT-MJ-04034	4
		Major-8 (Plant Resources and Economic Botany)	BOT-MJ-04044	4
	*Minor	Minor-4 (Plant Resources and Economic Botany)	BOT-MN-04014	4
*Here, the minor paper indicates the minor paper offered by the Department of Botany for the students other than Botany Major.				
5	Major	Major-9 (Genetics)	BOT-MJ-05014	4
		Major-10 (Plant Ecology, Phytogeography and Climate Change)	BOT-MJ-05024	4
		Major-11 (Plant Systematics)	BOT-MJ-05034	4
	*Minor	Minor-5 (Plant Systematics)	BOT-MN-05014	4
	Internship	Internship		4
*Here, the minor paper indicates the minor paper offered by the Department of Botany for the students other than Botany Major.				
6	Major	Major-12 (Reproductive Biology of Angiosperm)	BOT-MJ-06014	4
		Major-13 (Plant Metabolism and Biochemistry)	BOT-MJ-06024	4
		Major-14 (Molecular Biology)	BOT-MJ-06034	4
		Major-15 (Applied Plant Biology)	BOT-MJ-06044	4
	Minor	Minor-6 (Applied Plant Biology)	BOT-MN-06014	4
*Here, the minor paper indicates the minor paper offered by the Department of Botany for the students other than Botany Major.				
B.Sc. Botany with Honours				
7	Major	Major-16 (Plant Breeding,	BOT-MJ-07014	4

		Genomics and Bioinformatics)		
		Major-17 (Conservation Ecology and Biodiversity Assessment)	BOT-MJ-07024	4
		Major-18 (Plant diseases, diagnostic and management)	BOT-MJ-07034	4
		Major-19 (Environmental Microbiology)	BOT-MJ-07044	4
		Research Component (RC1) Research Methodology	BOT-RC-07014	4
8	Major	Major-20 (Molecular Genetics and Cell Signalling)	BOT-MJ-08014	4
		Major-21 (Fungal Diversity, Genetics, and Applications)	BOT-MJ-08024	4
		Major-22 (Exploring Cryptogams and Gymnosperms)	BOT-MJ-08034	4
		Major-23 (Plant Growth and Morphogenesis)	BOT-MJ-08044	4
		One Mocs course related to advance techniques		4
		Or		
		One Seminar/Project based course and presentation.		4
OR				
B.Sc. Botany Honors with Research				
7	Major	Major-16 (Plant Breeding, Genomics and Bioinformatics)	BOT-MJ-07014	4
		Major-17 (Conservation Ecology and Biodiversity Assessment)	BOT-MJ-07024	4
		Major-18 (Plant diseases, diagnostic and management)	BOT-MJ-07034	4
		Major-19 (Environmental Microbiology)	BOT-MJ-07044	4
		Research Component (RC1) Research Methodology	BOT-RC-07014	4
8	Major	Dissertation-8		16
		One Mocs course related to advance techniques		4
		Or		
		One Seminar/Project based course and presentation.		4
M.Sc. Botany				
Research with course works				
9	Major	Major-24 (Advance Genetics)	BOT-MJ-09014	4
		Major-25 (Ecological Restoration and Remediation)	BOT-MJ-09024	4
		Major-26 (Microbial Diversity)	BOT-MJ-09034	4
		Major-27 (Applied Microbiology)	BOT-MJ-09044	4
		Major-28 (Advanced Plant Physiology and Biochemistry)	BOT-MJ-09054	4
10	Major	Dissertation Phase – I		20

BOTANY

SYLLABUS OFR SEC

DETAIL SYLLABUS OF SEC 1ST SEMESTER

Title of the course	**SEC-1 (Mushroom cultivation technique)**
Course code	**BOT-SEC-01013**
Total Credit (theory-practical)	03
Contact hours	
Distribution of Marks	
Course outcomes	On successful completion of the course, students will be able to: • Identify edible and poisonous mushrooms • Gain the knowledge of cultivation of edible mushrooms and spawn production; and various postharvest technology associated to mushroom cultivation • Manage various diseases and pests of mushrooms • Learn the way of self-employment and income generation

Theory [Total Marks : 60] Credit :03 : Total No. of Classes : 45

Unit	Content	Lecture (L)	Marks	Tuotorial (T)	Practical (P)	Total Hours
Unit-1	Introduction to mushrooms Mushrooms - taxonomic rank. Different parts of typical mushroom; structure and texture of fruitbodies - Gilled fungi and pore fungi; Life cycle of mushrooms; various habitats of mushrooms - Lignicolous, Humicolous and Coprophilous; Symbiotic associations - Mycorrhiza.					
Unit-2	Cultivation of Mushrooms History, scope, and opportunities of mushroom cultivation. Problem in cultivation - diseases, pests, and nematodes and their management strategies.					
Unit-3	Health benefits of mushrooms					

	Historical uses of mushrooms; Nutrient profile of mushrooms - Amino acids, Protein, Carbohydrates, fats, minerals, and vitamins; Therapeutic aspects - antioxidant, antimicrobial, antidiabetic, anticancer effect; stimulating vitamin D production in mushrooms.					
Unit-4	Common edible and poisonous mushrooms : Edible Mushrooms - Oyster mushroom (Pleurotus ostreatus), paddy straw mushroom (Volvariella volvcea), Button mushroom (Agaricus bisporus); Poisonous mushroom – False parasol or green-spored parasol (Chlorophyllum molybdites).					
Unit-5	Principles of mushroom cultivation Structure and construction of mushroom house; Spawn production - culture media preparation, isolation of pure culture, mother spawn, multiplication of spawn; Sterilization of substrates. Composting techniques, mushroom bed preparation; Spawning, spawn running, harvesting. Cultivation of oyster mushroom.					
Unit-6	Post harvest technology Preservation of mushrooms - freezing, drying, and packaging, quality assurance, shelf life,					

	market opportunities. Value added products of mushrooms.					
PRACTICAL [Credit : 01]						
1. Preparation of media for mushroom culture **2.** Preparation of pure culture **3.** Production of spawn **4.** Cultivation of oyster mushroom using paddy straw/lignocellulosic wastes. (All the students should do in groups)						

Suggested Readings

1. Purkayastha RP, Chandra A (1985) Manual of Indian edible Mushrooms. Today and Tomorrows Printers and Publishers, New Delhi.

2. Pathak VN, Yadav N (1998) Mushroom Production and Processing Technology. Agrobios, Jodhpur.

3. Tripathi DP (2005) Mushroom Cultivation. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

4. Pandey RK, Ghosh SK (1996) A Hand Book on Mushroom Cultivation. Emkey Publications.

5. Hait G (2023) Introductory Botany (Biofertilizer and Organic Farming, Herbal technology, Mushroom Culture Technology). Vol - I, Global Net Publication, New Delhi.

6. Pathak VN, Yadav N, Gaur M (2000) Mushroom Production and Processing Technology. Vedams Ebooks Pvt. Ltd., New Delhi.

DETAILS SYLLABUS OF SEC 2ND SEMESTER

Title of the course	SEC-2 Biofertilizer
Course code	BOT-SEC-02013
Total Credit (theory-practical)	03
Contact hours	
Distribution of Marks	
Course outcomes	

Unit	Content	Lecture (L)	Marks	Tuotorial (T)	Practical (P)	Total Hours
Unit-1	Fertilizers and types of fertilizers- organic, inorganic, and biofertilizers. General account of biofertilizer- different types, benefits. – *Rhizobium*, Actinorrhizal symbiosis .	4				
Unit-2	*Azospirillum* : isolation and mass multiplication. *Azotobacter* – crop response to Azotobacter inoculum.	4				
Unit-3	Cyanobacteria (blue green algae), *Azolla* and *Anabaena azollae* association, benefits of field application.	4				
Unit-4	Mycorrhizal association , types of mycorrhizal association , colonization of VAM and its influence on growth and yield of crop plants.	5				
Unit-5	Organic farming – Green manuring and organic fertilizers. Biocompost making methods, types and method of vermicomposting – field application, methods and benefits	5				
Unit-6						
PRACTICAL [Credit : 01]						
1. To study the process of Vermicompost **2.** Estimation of solid waste generated by a domestic system (biodegradable and non- biodegradable) and its impact on land degradation **3.** Mycorrhizal association-pictures						

Suggested readings

1. Dubey, R.C.,2005 A text book of biotechnology S.Chand & Co, New Delhi
2. Kumaresan, V.2005, Biotechnology, Saras Publications, New Delhi
3. John Jothi Prakash, E. 2004. Outlines of Plant Biotechnology. Emkay Publication, New Delhi
4. Sathe, T.V. 2004 Vermicult+ure and Organic Farming. Daya publishers
5. Subha Rao, N.S.2000, Soil Microbiology, Oxford & IBH Publishers, New Delhi
6. Vayas, S.C, Vayas, S. and Modi, H.A. 1998 Bio-fertilizers and organic Farming Akta Prakashan, Nadiad

DETAILS SYLLABUS OF SEC 3RD SEMESTER

Title of the course	SEC-3 (Environmental Ethics)
Course code	BOT-SEC-03013
Total Credit (theory-practical)	03 (Theory= 02+ Practical=01)
Contact hours	
Distribution of Marks	
Course outcomes	Students will be able to understand the environmental problems and will learn environmental ethicsfor the protection of environment and to use natural resources in a sustainable manner.

Theory [Total Marks : 60] Credit :03 : Total No. of Classes : 45

Unit	Content	Lecture (L)	Marks	Tuotorial (T)	Practical (P)	Total Hours
Unit-1	Understanding Environmental Ethics a. Concept of environmental ethics b. Importance of environmental ethics					
Unit-2	Environmental issues a. Pollution-various types, sources and control measures					
Unit-3	Environment and Politics a. Ecologism b. Ecofeminism e. Sustainable Development					
Unit-4						
Unit-5						
Unit-6						
PRACTICAL [Credit : 01]						
Project/Assignment						

Suggested Readings:

Attfield. Robin, Environmental Ethics A Very Short Introduction, Oxford, 2019

Baker. Susan, Sustainable Development, Routledge, New York, 2006

Basak. Anindita, Environmental Studies, Pearson, 2009

Carter. Neil, The Politics of the Environment: Ideas, Activism, Policy, Cambridge Un Press, New York, 2007

Heywood. Andrew, Political Ideologies An Introduction, Red Globe, 2022

Kaushik. Anubha& Kaushik, C.P., Perspectives in Environmental Studies, New A Publishers, 2018