SYLLABUS FOR THE BATCH FROM YEAR 2025 TO 2026

FOR
Certificate Course in Field Botany

(Credit Based Evaluation and Grading System)

Six Months

EXAMINATIONS: 2025-2026

The Certificate Programme Offered:

- **Certificate Course in Field Botany (6 Months duration)**

Program Outcomes:

- **Fundamental Knowledge of Field Botany** – Students will gain an understanding of the core principles and concepts of botany and its various applied aspects.
- **Enhanced Technical Skills** – The program focuses on improving students' technical abilities such as:
    - Identification of plants along with documentation and preservation.
    - Understanding the processes involved in utilizing plants for various industrial purposes.
    - Application of sustainable practices in plant resource management.
- **Career Readiness and Employability** – The program prepares students for entry-level positions in *Ayurpharma*/ herbal industries and Botanist/Botanical assistant/ Preservation assistant/Forest ranger *etc.* by equipping them with relevant skills and knowledge.

Department of Botanical and Environmental Sciences

In collaboration with

Directorate of Open & Distance Learning and Online Studies

GURU NANAK DEV UNIVERSITY AMRITSAR

Eligibility:

- 10+2 or equivalent Examinations.
- Any student pursuing Bachelor Degree, Master Degree, M.Phil., Ph.D. from GNDU campus constituted or affiliated college.

Paper Code	Subject	Marks			Credits
		Internal Assessment	End Term	Total	
ODCFB 111T	Plant Identification and Herbarium Techniques	30	70	100	4
ODCFB 112T	Plant Diversity and Conservation Strategies	30	70	100	4
ODCFB11 3T	Economic Botany	30	70	100	4
ODCFB 114T	Agricultural Practices and Plant Pathology	30	70	100	4
Total Marks & Credits		**120**	**280**	**400**	**16**

Plant Identification and Herbarium Techniques
Subject Code : ODCFB 111T
(Semester-I)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section A

1. **Foundations of Plant Identification**: Introduction to plant taxonomy and systematics, plant morphology and terminology, introduction to major plant families, using dichotomous keys and field guides.

Section B

2. **Field Techniques for Plant Collection:** Planning a plant collection trip, ethical and sustainable plant collecting, plant specimen collection techniques, initial processing and preservation in the field.

Section C

3. **Herbarium Techniques:** Preparation and curation**,** herbarium specimen mounting, specimen labelling and documentation, herbarium storage and pest management, herbarium curation and data management.

Section D

4. **Advanced Topics and Applications:** Microscopic plant identification, molecular techniques in plant identification, herbarium use in research and conservation.

Suggested readings

1. Judd W. S., Campbell C.S., Kellogg E.A., Stevens P.A. and Donoghue M.J. (2002) Plant Systematics: A Phylogenetic Approach. SinauerAssociates, Inc., Massachusetts.
2. Nei M. and Kumar S. (2000) Molecular Evolution and Phylogenetics. Oxford University Press, New York.
3. Raven P.H., Begr L.R., Hassenzahl D.M. (2008) Environment. 6th edition. John Wiley &Sons, Inc., New York.
4. Pandey, A. K. &Kasana, S. (2021). Plant Systematics. CRC Press.

Learning Outcome:

This syllabus aims to provide an understanding of identification of plants (collection and preserving techniques), field surveys and documentation with various applied aspects.

Plant Diversity and Conservation Strategies
Subject Code : ODCFB 112T
(Semester-I)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section-A

1. Introduction to Plant Diversity, Threatened Plants and their Conservation: Phytogeography and hotspots in India and the world, endemism, defining threatened plants as per IUCN, importance of plant conservation, threats to plant biodiversity, conservation strategies, threats to plant diversity, consequences of loss of floral diversity.

Section-B

2. Plant Conservation Strategies: In-Situ and Ex-Situ conservation, protected areas and their management, community-based conservation, habitat restoration, conservation of specific ecosystems, seed banks and gene banks, botanic gardens, organizations involved in resource conservation, general account on activities of various agencies at national and international level, People's Biodiversity Register (PBR).

Section-C

3. Germplasm preservation: Germplasm preservation—definition, importance, methods, In-situ and Ex-situ conservation, Centers of germplasm preservation in India.

Section-D

4. Plant tissue culture techniques: Micro propagation and its applications; types, stages, establishment of propagated plants, micro propagation for large scale multiplication of crop plants, forest trees, medicinal plants and ornamentals. Micro propagation through various explants (leaf, stem, axillary bud, tuber, corms and bulbills),

Suggested References

1. Bhojwani, S. S. and Dantu, P. K. (2013). Plant Tissue Culture: An Introductory Text, Springer Publications.
2. George, F.E., Hall, M. and Klerk, G. J (2008). Plant propagation by Tissue Culture 3rd edition Vol I, Springer Publications.
3. Heywood, V.H. and Waston, R.T. (1995). Global Biodiversity Assessment, Cambridge House, Delhi.

Learning Outcome:

This syllabus aims to provide an understanding of plant conservation strategies of threatened plant taxa using traditional and biotechnological interventions.

Economic Botany
Subject Code : ODCFB 113T
(Semester-I)

Time: 03 Hours **Max. Marks: 100 Marks**

Internal Assessment: 30 Marks

End Term: 70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section A

1. **Plants in Agriculture and Food Industry:** Food plants: *Oryza sativa* (Rice), *Triticum aestivum* (Wheat), *Zea mays* (Maize), *Solanum tuberosum* (Potato) and *Saccharum officinarum* (Sugarcane).
2. **Fibres:** *Gossypium hirsutum* (Cotton) and *Chorchorus capsularis* (Jute).

Section B

3. **Vegetable oils:** *Arachis hypogea* (Groundnut), *Brassica campestris* (Mustard) and *Cocos nucifera* (Coconut).
4. **Medicinal Plants:** *Terminalia chebula* (Harar), *Terminalia belerica* (Bahera), *Azadirachta indica* (Neem), *Phyllanthus emblica* (Amla), *Datura stramonium* (Datura), *Withania somniferum* (Ashwagandha) *and Papaver somniferum* (Poppy).

Section C

5. **Plants in Timber Industry:** Timber yielding trees of India and their products (Shisham, Sal, Teak, Deodar, Babool); Bamboo industry.
6. **Leaf based Industry:** Utility products of leaf (Palash, Banana); Tea industry; Leaf oil industry (Mint, Camphor, Neem, Tulsi, Eucalyptus, Lemon grass); Leaves used as spices (Kasoori Methi, Pudina, Curry patta, Tejpatta).

Section D

7. **Plants in Color Industry**: Natural Food colorants, flavors, and preservatives; plants in textile industry (cotton, flax, jute fibres).
8. **Other industrial crops and their processing:** Sugar and jaggery industries, edible oil industry (Groundnut, Mustard, Coconut), plants as biofuel sources, pulp and paper production from plant fibres.

Suggested Readings:

1. Das, K. (2010). Medicinal Plants: Their importance in Pharmaceutical Sciences, Kalyani Publishers, New Delhi.
2. Kocchar, S.L. (2000). Economic Botany of the Tropics, Macmillan India Pvt. Ltd., New Delhi.
3. Wickens, G. E. (2012). Economic Botany: Principles and practices. Kluwer Academic Publishers, The Netherlands, ISBN: 0792367812
4. Sen, S. (2009). Economic Botany. New Central Book Agency, Kolkata, ISBN: 8173812063

Learning outcomes:

This syllabus aims to provide an understanding of botanical principles underlying plant-based industries and describe the processes involved in utilizing plants for various industrial purposes.

Agricultural Practices and Plant Pathology
Subject Code : ODCFB 114T
(Semester-I)

Time: 03Hours **Max.Marks:100Marks**

InternalAssessment:30 Marks

EndTerm:70 Marks

Instructions for the Paper-Setter/examiner:

1. Question paper shall consist of **Four sections**.
2. Paper setter shall set **Eight questions** in all by selecting **Two questions** of equal marks from each section. However, a question may have sub-parts (not exceeding four sub-parts) and appropriate allocation of marks should be done for each sub-part.
3. Candidates shall attempt **Five questions** in all, by at least selecting **One question** from each section and the **5th question** may be attempted from any of the **Four sections**.
4. The question paper should be strictly according to the instructions mentioned above. In no case a question should be asked outside the syllabus.

Section A

1. **Fundamentals of Agricultural Practices:** Agronomic principles and practices, soil and fertility management, water management, farm machinery and post-harvest processing.

Section B

2. **Crop Production and Management:** Crop Production, basics of fruit culture and propagation, concepts and methods of organic farming.

Section C

3. **Fundamentals of Plant Pathology:** Introduction to plant pathology, factors responsible for causing plant diseases, identification of signs and symptoms of plant diseases, biochemical defense mechanism in plants.

Section D

4. **Plant Diseases and their Control Measures:** Diseases of crop plants(rust of wheat, loose smut of wheat, white rust of crucifers, red rot of sugarcane) and methods for controlling plant diseases.

Suggested readings:

1. Walia, S.S. and Walia, U. S. (2020). Farming System and Sustainable Agriculture. Scientific Publishers, India, pp 1-280.
2. Kumar, N. S., Rajasekar, M., Kumar, M. S. (2022). Principles and Practices of Organic Farming: Organic farming definition, Prospects, Principles and concepts - Introduction to bio diversity - Pre requisites and basic steps for organic farming Organic carbon; status and improvement strategies - Sources of organic manures - Off farm resources-Organi. Orange Books Publication, India, pp 1-261.
3. Rakshit, A., Stanley, J., Rao, S., Meena, S. K., Meena, V. S. (2021). Advances in Organic Farming: Agronomic Soil Management Practices. Elsevier Science, United Kingdom, pp 1-270.
4. Vashista, B.R. and Sinha, A.K. (2016). Botany for degree students-Fungi. S. Chand and Company Ltd, New Delhi, pp 1-752.
5. Singh, R. S. (2017). Introduction to Principles of Plant Pathology. CBS Publishers & Distributors, India, pp 1-416.

Learning outcome:

This syllabus aims to provide a comprehensive understanding of agricultural practices and plant pathology, equipping students with the knowledge and skills needed for a career in agriculture