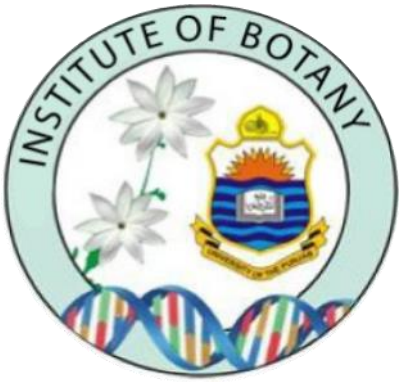
CURRICULUM

OF

BOTANY
Associate Degree Program
(For Affiliated Colleges)



INSTITUTE OF BOTANY
UNIVERSITY OF THE PUNJAB
LAHORE (PAKISTAN)

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UNIVERSITY OF THE PUNJAB, LAHORE

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Convener BOS Botany

Program Title: Associate Degree Program
Department: Institute of Botany
Faculty: Faculty of Life Sciences
Paper Code: NBOT-120

1. Mission of the Institute

Our mission is to impart concept-based education in various areas of Plant Sciences together with inculcating a problem-solving approach in research to produce top quality scientists and teachers, capable of playing a useful role in society. We are trying to deliver the youth the latest knowledge in Plant Sciences, incorporating modern trends. It is our hope and belief that our students master the analytical and methodological skills required to evaluate and conduct research in their areas of specialization. We intend to create and demonstrate an ability in the students to work effectively with other people from various ethnic, educational, and work experience backgrounds.

2. Introduction of the Institute

The Institute of Botany, University of the Punjab, Lahore is the oldest in the country and has produced many distinguished scholars ever since its establishment in 1924. Initially it was housed in the premises of Government College, Lahore and M.Sc. teaching was conducted jointly by the staff of Government College, Lahore and the University of the Punjab, Lahore. The Institute moved to the Quaid-e-Azam Campus in 1963 and was housed in various buildings until its present building was constructed in 1973. The whole faculty (03 Professors, 03 Associate Professors, and 09 Assistant Professors) is actively engaged in teaching and research activities. The Institute is known for its outstanding research in major areas of plant sciences. Until the year 2000, the Institute was running only the regular two-year M.Sc. degree program in the Annual System of examination. The B.Sc. Honors (3 year) and M.Sc. Honors (2 year) programs were launched in the year 2001 in the semester system. The regular M. Phil and Ph.D. programs were also started in the department in the year 2001, Ph.D. in the semester system and M.Phil in the semi-annual (term) system. In the year 2005, B.Sc. (Hons.) and M.Sc. (Hons.) programs were converted to B.S. (4 year) and M.S. (2 year) programs and M.Phil/M.S. leading to Ph.D. programs were also introduced in the Semester System of examination. Each year students in all courses are inducted in the fall semester commencing in September. Currently BS, M.Sc., MS/M.Phil and Ph.D. Programs are being run in the department**.** At present, there is one auditorium (for seminars, Ph.D. defense and other academic activities), four moderately sized and seven small lecture rooms for regular classes. There are five general laboratories and one central resource laboratory which are moderately equipped. The Institute has eleven research laboratories according to subject specialization with an elaborate research program involving national and international collaborations with academia, industry and government organizations. Currently, many research projects are being run by the faculty members. The Institute has a Library, Computer laboratory, a Common Room, Herbarium, Botanical Garden, Seed Centre, Greenhouses and Climatic rooms for research experiments. Since its establishment in 1924, as Department of Botany, it has played a leading role at national level by producing active and trained teachers and researchers.

3. Program Introduction

Knowing about plants is fundamental to keeping a sustainable biosphere, as well as, securing well-being of mankind on long term basis. Getting knowledge and doing research on plant's visual appearance, growth, evolution, breeding, utilization and environmental interactions is highly important. Studying Botany can help one excel in the basic disciplines such as, Anatomy, Biochemistry, Biophysics, Bryology, Cytology, Ecology, Genetics, Lichenology,

Molecular Biology, Microbiology, Morphology, Mycology, Paleobotany, Pteridology, Phycology, Physiology, Systematics, Systems Ecology and Taxonomy. poverty. The Associate Degree is a two-year post-intermediate or equivalent academic degree to be awarded by public & private Universities/DAIs. The concept behind introducing the associate degree program is to offer a skilled based degree. Associate degree is offered primarily in market driven subjects based on local and regional community and industry needs to be determined through a comprehensive survey to be carried out by the University/Institution concerned. The main objective of this program is to produce trained manpower with the trait of independent thinking, that can play a leading role in teaching, research, industry, forestry, research organizations etc. This program is a blend of theoretical and practical knowledge to equip students with current data in their particular field. This Program is being offered at the affiliated colleges.

4. Program Objectives

The educational objectives of the Associate degree program are to produce graduates who are able to:

- Specialize at least one sub-discipline of Botany
- Keep current with the latest advancements in the various fields of Botany
- Possess a good moral and ethical character
- Pursue graduate studies leading to graduate degree
- Define and diagnose research problems in the various fields of Botany and implement solutions
- Communicate effectively with technically and professionally diverse audiences
- Master the analytical and methodological skills required to evaluate and conduct research in their area of specialization.
- Demonstrate an ability to work effectively with other people from various ethnic, educational, and work experience backgrounds.

5. Market Need / Rationale of the Program

Basic and applied research is a continuum and they are inter-dependent. Whether at basic or applied level, the study of plants stands central amongst several disciplines. Institute of Botany is playing its role in disseminating knowledge and doing research on different aspects of plant sciences. This degree program will enable the students to professionally excel in the field of Plant Sciences through meeting today's market requirements. Job opportunities usually depend upon educational training and experience. New positions in Botany are expected to increase at an above-average rate in next few decades. Growing world population continues to increase the need for better food supplies. Environmental concerns, such as air, water and soil pollution, will create openings for Ecologists in government and industry. The search for new drugs and medicines and useful genes for improving crop plants will continue to create a need for botanical explorers. Further entrepreneurial initiatives are also likely to be seen in the near future as this particular aspect is also the current focus of the teaching faculty at the Institute of Botany.

a) Scope

i. Public Sector:

- Public Sectors Departments
- School, Education Departments/Programs
- Research and Teaching Institutes
- International Organizations: UNICEF, UNDP, WHO, FAO, World Bank
- Non-Governmental Organizations
- Community Development Program

- Motivational speaker

ii. Private Sector:

- Multinational Companies
- Independent Private Practice
- Forestry Department
- Food Industries
- Pharmaceuticals Industry
- Hospitality industry
- Private Companies and Hospitals

iii. Foreign Countries:

- Public Departments in Middle East, Europe etc.
- Independent Private Practices

6. Admission Eligibility Criteria

- As provided by the University

7. Duration of Degree Program

Minimum duration 4 Years
Total number of Credit hours (Flexible from 124-137)
Semester duration 16-18 weeks
Semesters 8
Course Load per Semester 12-18 Cr hrs
Number of courses per semester 4-6

8. Assessment Criteria

Sessional Work: 25 marks
Midterm Exam: 35 marks
Final Exam: 40 marks

FORESTRY

Paper Code: NBOT-120 **Credit Hours: 3 (2+1)**

THEORY:

Introduction of Course:

The course is organized to provide adequate knowledge of Forests, Forestry and its role in the Ecology, Economic and Social conditions of the country. It is generally aimed at teaching students to assess Forest resources, their scientific management and how to protect these natural resources.

Course Objectives:

The course is designed:

1. To provide adequate knowledge of Forests and their role in the Ecology of a country
2. To give an insight into forest communities and their distribution
3. To provide knowledge about Forest resources and their scientific management

Contents:

1. Introduction:

1.1. Importance and history of forestry.
1.2. Role of forests in climate change, wildlife conservation.
1.3. Role in habitat and ecosystem conservation.
1.4. Role in C sequestration.
1.5. Current situation of forests in Pakistan.

2. Forest Types and their Geographical Distribution in Pakistan:

2.1. Tropical Littoral and Swamp Forests.
2.2. Tropical Thorn forests.
2.3. Dry sub-tropical forests.
2.4. Sub-Tropical Pine forests.
2.5. Himalayan Moist Temperate forests.
2.6. Dry sub-tropical Broad-Leaved forests.
2.7. Dry Temperate forests.
2.8. Sub-alpine forests.
2.9. Alpine forest.
2.10. Riverain forests.
2.11. Irrigated forests.

3. Silvicultural System:

3.1. Classification.
3.2. Choice of Silvicultural system.

4. Management of Forests:

Management practices in the following forests:
4.1. Coniferous forests.
4.2. Scrub forests.
4.3. Irrigated plantations.
4.4. Riverain forests.
4.5. Mangroves.

5. Protection of Forests:

5.1. Protection against man, animals and injurious plants.

5.2. Protection against fire, insects and disease.

6. **Range Management:**
   - 6.1. Rangeland resources of Pakistan.
   - 6.2. Rangeland Improvement.
7. **Landscape Planning:**
   - 7.1. Trees in landscaping.
   - 7.2. The role of shrubs in landscape designing.
8. **Forest Conservation and Urbanization Challenges:**
   - 8.1. Biodiversity and forests.
   - 8.2. Anthropogenic influences and urbanization.
   - 8.3. Forest mapping using GIS and RS.

Practical:

1- Study of various forest types of Pakistan.
2- Study of Silvicultural systems.
3- Study of forest management of various forests.
4- Study of social forestry / Agro-Forestry / community forestry.
5- Visit to some water-shed areas.
6- Visit to range management areas and wildlife habitat.
7- Visit to various National parks.
8- Visit to City Park for landscaping.
9- Submission of tour diaries based on field observations.

Teaching-learning Strategies:

- Lectures
- Group discussion
- Presentations / Seminars
- Tutorials
- Assignments

Learning Outcome:

1. Students are expected to learn about forest communities, their distributions, ecological, socioeconomic impact and protection of this natural resource.
2. They may use this brief and basic information to apply practically should they enter in the field of forestry as a young associate.
3. The course provides basic information and interest in this important field that may lead to further studies in forestry thus becoming part of it professionally.

Assessment strategies:

- Lecture based examinations (objective and subjective)
- Presentations / Seminars
- Class discussions
- Quiz

Recommended Books

1. Alexopoulus, C. J., Mims, C. W. & Blackwell, M. (1996). *Introductory Mycology* (4nd Ed.). John Wiley and Sons, Ltd. Tappar Co. Ltd, Tokyo.
2. Beeson, C. F. C. (1961). *The ecology and control of Forest insects of Indian and Neighboring countries*. Government of India.

3. Daniel, H. B. (1979). *Principles of Silviculture*. McGraw-Hill. ISBN 0070152977, 9780070152977.
4. Doubenmire, R. (1968). *Plant communities*: A text book of plant synecology. Harper & Row, New York, USA.
5. Francois, T. (1950). Forest Policy, Law and Administration. Food and Agriculture Organization of United States (FAO), Washington.
6. Honnay, O. (2004). *Forest Biodiversity–Lessons from history for conservation*. Wallingford, Oxfordshire, UK; Cambridge, M.A., USA: CABI Pub. ISBN:0851999239978085199923 4.
7. Ian, H. (1999). *Forest Management in Nepal, Economics and Ecology*. World Bank, ISBN:0-8213-4480-3.
8. Iqbal, S. M., and Hafeez, S. M. (2001). *Forest and Forestry of Pakistan*. A-One Publishers, Urdu Bazar, Lahore.
9. Kimmins, J. P. (1997). *Forest Ecology*. Prentice Hall.
10. Kohyama, T. (2005). *Forest Ecosystems and Environments, Scaling up from Shoot Module to Watershed*. Tokyo Springer-Verlag, ISBN: 44312607499784431260745.
11. Longman, K. A. (1974). *Tropical Forest and its Environment*. Longman, UK.
12. Metcalf, C. L. and Flint, W. P. (1993). *Destructive and useful insects, their habits and control*. New York: Mc Graw Hill.
13. Sands, R. (2005). *Forestry in Global Context*. CABI Head office, Oxfordshire.
14. Shappard, S. R. J., and Harshaw, H. W. (2001). *Forests and Landscapes linking Ecology, Sustainability and Aesthetics*. 1st Edition. CABI Publishing.
15. Smith, W. H. (1981). *Air Pollution and Forests*. Springer-Verlag.
16. Stoddart, J. A., Smith, A. D. & Baix. (1975). *Range management*. New York McGraw Hill.
17. Weiss, G., Pettenella, D., Ollonqvist, P. & Slee, B. (2011). *Innovation in Forestry*: Territorial and value chain relationships. CABI Head office, Oxfordshire.