

| Programme                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | BS Botany                           | Course Code | BOT-301L | Credit Hours | 1 |
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| <b>Course Title</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>Advanced Plant Ecology (Lab)</b> |             |          |              |   |
| <b>Lab Course Contents</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                     |             |          |              |   |
| <ul style="list-style-type: none"> <li>• Determination of frequency of occurrence of various plant species in a grass land community by Quadrature Method</li> <li>• Determination of vegetation cover (Percentage cover area) by Line Transect Method</li> <li>• Determination the Line Cover of the species in a plant community by Transect Method</li> <li>• Examination of industrial waste water/ municipal sewage water for some physical characteristic; <ul style="list-style-type: none"> <li>• Total Dissolved Solids (TDS)</li> <li>• pH and EC</li> <li>• BOD and COD, DO</li> <li>• Chlorides, Carbonates, Bicarbonates and Nitrates</li> </ul> </li> <li>• Field observation on the Sources and Impacts of various Air Pollutants.</li> <li>• Examination of the Effects of Automobile Exhaust on the Adjacent Vegetation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                     |             |          |              |   |
| <ul style="list-style-type: none"> <li>• Symptoms on plant leaves</li> <li>• Chlorophyll Content of plant leaves</li> <li>• Particulate matter on plant leaves</li> <li>• Effects of seed irradiation on seed germination and plant seedling</li> <li>• A visit to EPA to study the Instruments used for Monitoring Pollution.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                     |             |          |              |   |
| <b>Textbooks and Reading Material</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                     |             |          |              |   |
| <ol style="list-style-type: none"> <li>1. Begon, M. Howarth R. W., Townsend C. R. (2014). <i>Essentials of Ecology</i>. 4<sup>th</sup> Edition Wiley. 480 pp.</li> <li>2. Chapman, J.L. and Reiss, M.J. (1999). <i>Ecology: Principles &amp; Applications</i>. Cambridge University Press. London. 330 pp.</li> <li>3. Hussain, F. (1989). <i>Field and Laboratory Manual of Plant Ecology</i>. National Academy of Higher Education, Islamabad.</li> <li>4. Schulze, E. D., Beck, E. K. and Müller-Hohenstein (2005). <i>Ecology</i>. Springer. 207 pp.</li> <li>5. Smith, T. M. and Smith R. L. (2006). <i>Elements of Ecology</i>. Pearson Canada. 645 pp.</li> <li>6. Berry, W.K. (2017). <i>Water Pollution</i> CBS Publisher and Distributer Pvt. Ltd.</li> <li>7. Goel, P. K. (2016). <i>Water Pollution: Causes, Effects and Control</i> (Revised 2<sup>nd</sup> edition) new AGE International Ltd Publisher.</li> <li>8. Ghafoor, A., Murtaza, G. M., Rehman, Z., Sabir, M. Ahmad, H. R. and Saifullah. (2012). <i>Environmental Pollution: Types, Sources &amp; Management</i>. Allied Book Centre, Urdu Bazar, Lahore.</li> <li>9. Treshow, M. (Latest Edition) <i>Environment and Plant Response</i>. Mcgraw-Hill NY.</li> <li>10. Koziol, M.J., Whatley, F. R. (Latest Edition) <i>Gaseous Air Pollution and Plant Metabolism</i>. Butterworths.</li> <li>11. Agrawal, K. C. (Latest Edition) <i>Environmental Biology</i> Agro Botanical Publishers, India.</li> <li>12. Johnson, C. E. (Latest Edition) <i>Eco-crisis</i> John Wiley &amp; Sons. Inc., New York, London. Toronto.</li> <li>13. Mansfield, T. A. (Latest Edition) <i>Effects of Air Pollutants on Plants</i> Cambridge University Press, London, New York, Melbourne.</li> </ol> |                                     |             |          |              |   |
| <b>Teaching Learning Strategies</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                     |             |          |              |   |
| <ul style="list-style-type: none"> <li>• Lectures</li> <li>• Group Discussion</li> <li>• Laboratory work</li> <li>• Seminar/ Workshop</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |             |          |              |   |
| <b>Assignments: Types and Number with Calendar</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |             |          |              |   |
| <ul style="list-style-type: none"> <li>• Lecture Based Examination (Objective and Subjective)</li> <li>• Assignments</li> <li>• Class discussion</li> <li>• Quiz</li> <li>• Tests</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                     |             |          |              |   |