Bot-311A & 312L **LOWER FUNGI** **Credit Hours: 3(2+1)**

THEORY:

Introduction of the Course:

The course is organized to provide an adequate knowledge about different fungal groups with their representatives along with their Taxonomy, Morphology, Anatomy and life cycle patterns. It is generally aimed to familiarize students with the morphological and systematic knowledge of different members of lower fungi, their structure and Economic importance.

Course Objectives:

The course is designed:

1. To provide an adequate knowledge about basic concepts of different fungal groups and their characteristics.
2. To give an insight into structure of lower fungi with an emphasis on their morphology, taxonomy and life cycle patterns.

Contents:

1. **General introduction to fungi**
   - 1.1. Cells, hyphae and tissues
   - 1.2. Economic importance
   - 1.3. Sexual and asexual reproduction
   - 1.4. Zoosporogenesis
   - 1.5. Classification-principles of taxonomy
   - 1.6. Nomenclature and kingdom systems
2. **Kingdom Straminopila:**
   - 2.1. Importance, morphology, biology, taxonomy and nomenclature of Hyphochytridiomycota, Labyrinthulomycota and Oomycota
   - 2.2. Important characters and classification of Oomycota up to orders and family's level
   - 2.3. Importance and life cycles of fungal spores in Saprolegniales, Peronosporales, Sclerosporales and Pythiales
3. **Kingdom Fungi:**
   - 3.1. General characters, importance and classification up to phyla
   - 3.2. Chytridiomycota: General Characteristics and classification up to orders level
   - 3.3. Biology of *Synchytrium* and *Olpidium* spp.
   - 3.4. Evolution of orders into new phyla
4. **Zygomycota:**
   - 4.1. General characters, various types of asexual reproductive structures; Zygosporogenesis
   - 4.2. Role of hormones in sexual reproduction
   - 4.3. Heterothallism and classification up to order level
   - 4.4. Classification of Mucorales, Endogonales and Entomophthorales up to families and characteristics of important genera
   - 4.5. Evolution of Glomeromycota and their role in agriculture.
   - 4.6. Arbuscular mycorrhiza.
   - 4.7. Entomophthorales, their use as bio-control of insects.

Practicals:

1. Basic mycological techniques.
2. Isolation of fungi from soil, water and air using different techniques.
3. Processing and staining of roots for Arbuscular mycorrhizal assessment in roots of crop plants.

4. Isolation and identification of endogonaceous fungi from soil by wet sieving and decanting techniques.
5. Collection, preservation, culturing and identification of mycological specimens with special reference to taxa of agricultural importance; use of keys for their identification.
6. Examination of prepared slides of selected taxa.

Teaching-learning Strategies

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

Learning Outcome:

1. Students are expected to get familiarized with the morphological and systematic knowledge about different members of lower fungi.
2. They will be able to describe the concepts of what constitutes disease in plants and identify major principles of plant pathology.
3. This will enable them to employ methods to diagnose and manage a wide range of plant diseases caused by fungi.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. Alexopoulos, C.J., Mims, C.W. and Blackwell, M. (1996). *Introductory Mycology*, 4th edition, John Wiley and Sons. Inc., New York, USA.
2. Kendrik, B. (2000). *The Fifth Kingdom*. 3rd edition. Focus Publishing, Newburyport, MA. ISBN:1-58510-022-6.
3. Kirk, P.M., Stalpers, J.A., Minter, D.W. and Cannon, P. F. (2008). *Dictionary of fungi*. 10th ed. CABI, UK.
4. Lemke, P.A. and Esser, K. (2001). *The Mycota*. Volume VII. Systematics and Evolution. Part A. Springer.
5. Mirza, J. H., Khan, S. M., Begum, S. and Shagufta, S. (1979). *Mucorales of Pakistan*, University of Agriculture, Faisalabad, Pakistan.
6. Petrini-Klieber, L.E. and Petrini, O. (2013). *Identifying Moulds: A Practical Guide.* Gebruder Borntraeger Verlagsbuchhandlung, Science Publishers.
7. Webster, J. and Weber, R. (2007). *Introduction to Fungi*. Cambridge University Press.

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