COURSE TITLE: ADVANCE BOTANY-IV(SOIL AND AGRICULTURAL MICROBIOLOGY)

CREDIT HOURS: 3

Syllabus Outline: Study of Soil Microbes in relation to Soil Formation and Plant-Microbes nitration.

Course Outline:

Elements of Soil Formation and Conservation, Soil Microbial Population and Methods of Study with their Advantages and Disadvantages, Role of Microorganisms in Mineral Transformations with special and detailed emphasis on Carbon and Nitrogen Transformations, Brief Introduction to Sulphur and Phosphorus Transformation, Introduction to Soil Ecology, Plant Microbe Interactions and Microbe-Microbe Interactions and their Impact on Soil Fertility, Biotechnological Potentials of Soil Microorganisms, Importance of the Subject in the Agricultural Development of Pakistan, Problems of Salinity and Water Logging and the Methods of their Reclamations, Microbial Activities in Saline Soil. Biochemical, Physiological, Genetic, Ultra-Structural and Molecular Aspects of interaction between Plants and their Beneficial and Harmful Symbionts, Microbe's Role in Regulatory Mechanism of Plant Gene Expression.

Module aims:

Course is designed to provide essential knowledge about soil structure and composition and learning about soil biodiversity.

Learning Strategies:

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

Learning Outcomes:

Students are expected to have knowledge about Soil Microflora and then-effects on Soil Composition and Information about Agriculture Soils of Pakistan.

Assessment Strategies (Theory) :

The student will be assessed according to the following criteria

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended:

1. Berthelin, J., Bollag, J.M., Page, A.L., Huang, P.M., McGill, W.B. and Huang, P.M. (1999). Environmental Impacts of Soil Component Interactions: Natural and Anthropogenic Organics. Vol.1, Lewis Publishers.

2. Wang, K., EstreUa, A.H. and Montagu, M.V. (2004): Transformation of Plants and Soil Microorganisms (Plant and Microbial Biotechnology Research). No.3, Cambridge University Press.

3. Charles, J., Delecluse, A., Lerou, N. and Roux, C.N. (2000). Entomopathogenic Bacteria: From Laboratory to Field Application (1st Ed.), Kluwer Academic Publishers.

4. Rao, N.S.S. and Dommergues, Y.R. (2001). Microbial Interactions in Agriculture and Forestry. (2nd Ed.), Science Publishers

5. Glick, B.R., Patten, C.L., Holguin, G. and Penrose, D.M. (1999). Biochemical and Genetic Mechanisms Used by Plant Growth Promoting Bacteria. Imperial College Press.

6. Rao, N.S.S. and Dommergues, Y.R, (2000). Microbial Interactions in Agriculture and Forestry. (1st Ed.), Science Publishers.

TITLE: ADVANCE BOTANY-LAB-IV (SOIL AND AGRICULTURAL MICRO BIOLOGY)

CREDIT HOURS: 1

Syllabus Outline: Study of Soil Microbes in Relation to the Formation of Soil, Interaction with Plants and Enhancement of Soil Fertility.

Course Outline:

1. Study of role of Microbes in Soil Structure and Improvement.
2. Symbiotic and Antagonistic effects of microbes.
3. Sou/Crop improvement by microbes.
4. Reclamation of Saline and Water Logged Soils.
5. Determination of Genetic and Biochemical Molecular Aspects of Microbial Interaction with plants.
6. Use of Azospwittum and Azospirillum as Natural Fertilizers.

Module Aims: The course designed to guide Laboratory Techniques for study of Soil Microflora and their Interaction. Parameters and Spillers are provided for Study of Types of Soils and Their Composition.

Learning Strategies:

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

Learning Outcome: Students are expected to have knowledge about Soil Microbial Population, their Role for Enrichment Soil Composition and its Productivity.

Assessment Strategies (Practical) :
The student will be assessed according to the following criteria
Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended:

1. Berthelin, J., Bollag, J.M., Page, A.L., Huang, P.M., McGiIl, W.B. and Huang, P.M. (2005). Environmental Impacts of Soil Component Interactions: Natural and Anthropogenic Organics. Vol.1, Lewis Publishers. ,

2. Wang, K., Estrella, A.H. and Montagu, M.V. (2004): Transformation of Plants and Soil Microorganisms (Plant and Microbial Biotechnology Research No. 3, Cambridge University Press.

3. Charles, J., Delecluse, A., Lerou, N. and Roux, C.N. (2001). Entomopathogenic Bacteria: From Laboratory to Field Application (1st Ed.), Kluwer Academic Publishers.

4. Rao, N.S.S. and Dommergues, Y.R. (2001). Microbial Interactions in Agriculture and Forestry. (2nd Ed.), Science Publishers

5. Glick, B.R., Patten, C.L., Holguin, G. and Penrose, D.M. (2000). Biochemical and Genetic Mechanisms Used by Plant Growth Promoting Bacteria. Imperial College Press.

6. Rao, N.S.S. and Dommergues, Y.R. (2000). Microbial Interactions in Agriculture and Forestry. (1st Ed.), Science Publishers.