

## BS (4 Years) for Affiliated Colleges



Code	Subject Title	Cr. Hrs	Semester
<b>BOT-407</b>	<b>Biodegradation and Bioremediation</b>	<b>3</b>	<b>VII</b>
Year	Discipline		
<b>4</b>	<b>BOTANY</b>		

**Syllabus Outline:** Environmental Pollutants, Biodegradation and Microbial Technologies, Strategies for Bioremediation.

### Course Outline:

The Environment and Pollution: Introduction, Environmental Law.

Treatment Technologies.

Traditional Approaches to Pollution Control.

- Biotreatment Technologies for Pollution Control.
- Biocatalyst Selection and Genetic Modification.
- Enrichment and Screening Strategies.
- Design of enrichment strategies relating to the Environmental Source.
- Microbiological Techniques for Enrichment and Selection.
- Genetical Approach.

The Carbon Cycle and Xenobiotic Compounds:

Biodegradation and Microbial Technologies by Microorganisms.

- Acclimation
- Detoxification
- Activation
- Sorption
- Bioavailability: Sequestering and Complexing.
- Co-metabolism
- Environmental Effects.

Effects of Metals and Radionuclide on Environment.

Metal and Radionuclide Microbial Treatment.

Biotechnology for Metal and Radionuclide Removal and Recovery.

Recalcitrant Molecules.

**Module Aims:** The course is designed to provide the students the knowledge of Biodegradation of Pollutants and its Application in Biodegradation Studies.

**Learning Strategies:**

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

**Learning Outcome:** After studying this course students will be able to understand the Chemistry of Biodegradation and its Application in Biodegradation Studies.

**Assessment Strategies:**

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

**Books Recommended:**

1. **Tortora, G.J., Christine L., Case, C.L., Funke, B.R., Funke, B. and Case, C. (2006).** *Microbiology: An Introduction*. Pearson Education Publishers.
2. **Borlak, J. (2005).** *Handbook of Toxicogenomics: Strategies and Applications*. John-Wiley and Sons Limited.
3. **Heikki, M., Hokkanen, T. and Hajek, A.E. (2004).** Environmental Impacts of microbial Insecticide: Needs and Methods for Risk Assessment, Science.
4. **McEldowney, S., Hardmen, D.J. and Waite, S. (2003).** *Pollution: Ecology and Biotreatment*. Longman Scientific Technical.
5. **Mitchell, R. (2002).** *Environmental Microbiology*. (2<sup>nd</sup> Ed.), Wiley Liss.
6. **Tickner, J.A. (2002).** *Precaution, Environmental Science, and Preventive Public Policy*. Island Press.
7. **Sunahara, G.I., Agnes, Y., Renoux, A.Y., Thellen, C., Gaudet, C.L., and Pilon, A. (2002).** Environmental Analysis of Contaminated Sites. John-Wiley and Sons Limited.
8. **Chapelle, F.H. (2001).** *Ground – Water Microbiology and Geochemistry* (2<sup>nd</sup> Ed.), John Wiley and Sons. Inc.

9. **Alexander, M. (1999).** *Biodegradation and Bioremediation*. Academic Press, Inc.
10. **Poole, R.K. and Gadd, G. M (1989).** *Metal Microbe Interaction*. IRL Press.

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