

COURSE CODE: ENS-411
COURSE NAME: Environmental Biotechnology
CREDIT HOURS: Theory = 3 Practical = 0 Total = 3
CONTACT HOURS: Theory = 48 Practical = 0 Total = 48
PREREQUISITE: None
MODE OF TEACHING: Three hours of lecture per week

Course Description:

This course will provide a sound technical foundation for using biotechnology in solving environmental issues and cleanup of polluted environments. After completion of this course, students will be able to understand the significance, and application of biotechnology in the environment.

TOPICS COVERED:

Week#	Topics
1	Introduction to biotechnology
2-3	Tools in environmental biotechnology
4	Fundamentals of biological interventions
5	Recombinant DNA Technology
6	Genetic manipulations
7	GMOs: Release and Regulations
8	Environmental applications of GMOs
9	Midterm Exam – MSE
10	Biosafety concerns of GMOs
11	Bio-strategies for pollution control
12	Bioremediation, phytoremediation
13-14	Biofilm, Biomarkers
15	Biosensor, Bioreactors
16	Biosensor, Bioreactors

17	Ethic and legal problems in creations and use of transgenic organisms
18	End Semester Exam

Text and Material:

1. Environmental Microbiology. 2nd Edition. 2010. Edited by Ralph Mitchell and Ji-Dong Gu. John Wiley & Sons, Inc., Hoboken, New Jersey.
2. National Biosafety Guidelines. National Biotechnology Commission, Government of Pakistan.
3. Environmental Biotechnology: Theory and Application. 2nd edition, Gareth M. Evans and Judith C. Furlong. John Wiley & Sons Ltd, 2011.
4. Environmental Biotechnology: Principles and Applications by Bruce E. Rittmann and Perry L. McCarty, McGraw Hill; 2nd edition (2020).

ASSESSMENT SYSTEM:

Theoretical/Instruction	100%
Assignments	10%
Quizzes	15%
Mid Semester Exam	25%
End Semester Exam	50%
Practical Work	0%
Lab Attendance	0%
Lab Report	0%
Lab Quiz	0%
Lab Rubrics	0%