School of Bioengineering
Department of Biotechnology

B. Tech. Biotechnology
IV Year/VII Semester
BT0423- Environmental Bioremediation Technologies
Total hours: 45

Lesson plan

UNIT	Hours	Lecture Topic	Page Nos.	Reference	Learning outcomes
I	**1**	Introduction : Bioremediation- Types of Bioremediation	1-2	1	To make the student to learn about the basics and technical strategies of Bioremediation Technology to address the present day Environmental problems.
	2	Bioremediation of surface soil and sludges, Bioremediation of sub surface material	3-8	1	
	3	In situ technologies, Ex-situ technologies	195 - 201	2	
	4	Phytoremediation	78-88	5	
	5-7	Bioaugmentation of naturally occurring microbial activities- Environmental modification – use of co-substrates, oxygen supplementation(composting and aerobic bioreactors, in situ aeration)	192-193	2	
	8	General microbial strategies for initiating attack on xenobiotics	40 - 45	1	To learn the key role and mechanisms of microorganisms, synthesized enzymes in biodegradation of
	9-12	Biodegradation strategies for key classes of compounds	14-18, 409 - 431	1	

II	13	Factors affecting biodegradation	18 - 20	1	hazardous compounds and to reveal their kinetics and modelling
	14-16	Biodegradation kinetics	338 - 343	6	
	16-18	Biodegradation Engineering and Modelling	345-346	6	
	18-21	Biocatalysis enzymes and major reactions and its kinetics	135-139	6	
III	22	Restriction endonucleases	649-651	7	To study about the applications of advancement of molecular techniques in biodegradation of waste pollutants and environmental research.
	23	Techniques for restriction mapping	25-27	8	
	24	Vectors – Plasmid pBR 322 and Lambda phage, cosmid	654-655	7	
	25	Construction of chimeric DNA , Ligases,Gene cloning	200	8	
	26	Southern, Northern and western blotting	652-653	8	
	27	Construction of Genomic and cDNA libraries	656-657	7	
	28	PCR(Polymerase Chain Reaction) and Gene Cloning	658-659	7	
	29-30	Use of genetically altered microorganisms for field biodegradation of hazardous materials	240-246	8	
IV	31- 33	Hazardous wastes – Biodegradation of Hazardous wastes	129, 131- 135	2	To understand about the present scenario of Hazardous wastes and its detoxification through biological processes.
	34	Biological detoxification of cyanide	137 - 138	2	
	35	Market for hazardous waste management	136	2	
	36	Biotechnology application to hazardous wastes management – Source and management safety	147 - 152	2	
V	37-38	Nanotechnology for Bioreded iation of Heavy metals	211-219	3	To study about application of Nanotechnology and other recent developments in bioremediation process of various contaminants and to know about the biosensor technology for monitoring pollutants.
	39 - 40	New Bioremediation Technologies to Remove Heavy Metals and Radionuclide's using Fe (III), sulfate and Sulfur Reducing Bacteria	35-46	3	
	41- 42	Bioremediation of Petroleum Sludge using Bacterial Consortium and Biosurfactant	391 - 407	3	
	43-44	Biofilms in porous media: Mathematical Modeling Numerical Simulations	481 - 508	3	

	45	Biosensor Technology for monitoring pollutants	102 - 110	5	

Text Books:

1. Ronald L.Crawford, Don L. Crawford. “Bioremediation – Principles and applications”. Cambridge University Press, 2005
2. S.N. Jogdand . “Environmental Biotechnology- Industrial Pollution Management”. Himalaya Publishing House, 2012
3. Shree N. Singh, Rudra Tripathi. “Environmental Bioremediation Technologies”.Springer.
4. Bruce E. Rittmann, Perry L. McCarty. “Environmental Biotechnology: Principles and Applications”. Tata McGraw Hill Education Pvt. Ltd., 2012.
5. Alan Scragg. “Environmental Biotechnology”. Second Edition, Oxford University Press, 2005.
6. Daniel A. Vallero. “Environmental Biotechnology”. Academic press, 2011.
7. James D. Watson, Tania A. Baker, Stephen P.Bell, Alexander Gann, Michael Levine. “Molecular Biology of the Gene”. Fifth edition. Pearson Education, 2007.
8. Bernard R. Glick and Jack J. Pasternak. “Molecular Biotechnology-Principles and Applications of Recombinant DNA”. Panima Publishing Corporation, 2002.

Course coordinator : P.Radha
Mobile : 9443599966
Email : radha.p@ktr.srmuniv.ac.in