

DEPARTMENT OF CIVIL ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech - Environmental Engineering		
Course Title	Environmental Biotechnology		
Course Code	CE721	No. of Credits	3
Course Code of Pre-requisite subject(s)	NIL	Semester	I
Session	July 2021	Section (if, applicable)	
Name of Faculty	Dr. Yukesh Kannah R	Department	Civil Engineering
Official Email	yukesh@nitt.edu	Telephone No.	9677168896
Name of Course Coordinator(s) (if, applicable)	-		
Official E-mail	-	Telephone No.	-
Course Type (please tick appropriately)	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
SYLLABUS (approved in Senate)			
<p>Environmental Biotechnology - Principles and Concepts - Usefulness to Mankind - Degradation of High Concentrated Toxic Pollutants - Halogenated, Non Halogenated, Petroleum Hydrocarbons, Metals - Mechanisms of Detoxification -Oxidation - Dehalogenation - Biotransformation of Metals - Biodegradation of Solid Wastes - Biotechnological Remedies for Environmental Pollution - Decontamination of Groundwater - Bioremediation - Production of Proteins - Biofertilizers - Physical, Chemical and Microbiological Factors of Composting - Health Risk - Pathogens -Odor Management - Microbial Cell/Enzyme Technology - Adapted Microorganisms -Biological Removal of Nutrients - Algal Biotechnology - Extra Cellular Polymers - Biogas Technology - Concept of rDNA Technology - Expression Vectors - Cloning of DNA - Mutation - Construction of Microbial Strains - Radioactive Probes - Protoplast Fusion Technology - Applications - Environmental Effects and Ethics of Microbial Technology - Genetically Engineered Organisms - Microbial Containment - Risk Assessment. Bioremediation and Biodegradation - Microbial Catabolism of Organic Pollutant - Catabolic Enzymes – Biodegradation Detoxication Reactions - Biodegradation Kinetics - Requirements of Biodegradation – Nutritional, Environmental and Biological Factors - Monitoring and Assessment Methods - Soil Enzyme Assay - Bacterial Biosensors - Toxicological Risk Assessments – Improved Bioremediation by Engineering Microbes - Bioadsorbents - Metal Precipitation – Enzymatic Transformation of Metals.</p> <p>References</p> <ol style="list-style-type: none"> 1. Chaudhury, G.R., Biological degradation and Bioremediation of toxic chemicals, Dioscorides Press, Oregon, 1994. 2. Bhattacharya, B. C. and Banerjee R., Environmental Biotechnology, Oxford University Press, India, 2007. 3. Martin.A.M, Biological degradation of wastes, Elsevier Applied Science, London, 1991. 4. Blaine Metting.F (Jr.), Soil Microbiology Ecology, Marcel Dekker Inc., 1993. 			



COURSE OBJECTIVES

1. To study the principles and concepts of environmental biotechnology
2. To learn the applications of various biotechnological tools for the treatment and betterment of environment
3. To enumerate the various biotechnological remedies for environmental pollution
4. To brief the environmental effects and ethics of microbial technology

MAPPING OF COs with Pos

After successful completion of the course, the students should be capable to

Course Outcomes (CO)		Programme Outcomes (PO)										
CO 1	To explain the mechanisms of detoxification and biodegradation of solid wastes	5	.	1	5	1	3			1		
CO 2	To list out the different methods for bioremediation of environment and to design biological system for the removal of nutrients	3	1	1	3	1	3	3		3	1	
CO 3	To evaluate the benefit of microorganisms in degrading organic contaminants and to choose suitable microorganism for biodegradation of selected compounds.	5	5	5	5	3	3	1		1	3	3
CO 4	To select suitable assessment methods for bioremediation.	5	5	3	5	3	3	3	3	1	5	3

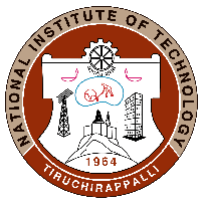
COURSE PLAN - PART II

COURSE OVERVIEW

This course entails the students to learn about the fundamentals of different construction methods for different components of a structures, diagnosis and repair of damages, strategies to select appropriate machines available for different construction activities.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Schedule (3 Hours/Week)	Topics	Mode of Delivery
1.	2 nd Week of September 2021	Environmental Biotechnology - Principles and Concepts - Usefulness to Mankind - Degradation of High Concentrated Toxic Pollutants.	Online / MS Teams
2.	3 rd Week of September 2021	Halogenated, Non Halogenated, Petroleum Hydrocarbons, Metals - Mechanisms of Detoxification -Oxidation – Dehalogenation.	Online / MS Teams



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3.	4 th Week of September 2021	Biotransformation of Metals - Biodegradation of Solid Wastes - Biotechnological Remedies for Environmental Pollution.	Online / MS Teams
4.	5 th Week of September 2021	Decontamination of Groundwater - Bioremediation - Production of Proteins - Biofertilizers.	Online / MS Teams
5.	2 nd Week of October 2021	Physical, Chemical and Microbiological Factors of Composting - Health Risk - Pathogens -Odor Management.	Online / MS Teams
6.	3 rd Week of October 2021	Microbial Cell/Enzyme Technology - Adapted Microorganisms -Biological Removal of Nutrients - Algal Biotechnology	Online / MS Teams
7.	4 th Week of October 2021	Extra Cellular Polymers - Biogas Technology - Concept of rDNA Technology – First Assessment	Online / MS Teams
8.	5 th Week of October 2021	Expression Vectors - Cloning of DNA – Mutation	Online / MS Teams
9.	1 st Week of November 2021	Construction of Microbial Strains - Radioactive Probes - Protoplast Fusion Technology – Applications	Online / MS Teams
10.	2 nd Week of November 2021	Environmental Effects and Ethics of Microbial Technology - Genetically Engineered Organisms - Microbial Containment - Risk Assessment.	Online / MS Teams
11.	3 rd Week of November 2021	Bioremediation and Biodegradation - Microbial Catabolism of Organic Pollutant.	Online / MS Teams
12.	4 th Week of November 2021	Catabolic Enzymes – Biodegradation Detoxication Reactions - Biodegradation Kinetics Second Assessment	Online / MS Teams
13.	5 th Week of November 2021	Requirements of Biodegradation – Nutritional, Environmental and Biological Factors	Online / MS Teams
14.	1 st Week of December 2021	Monitoring and Assessment Methods - Soil Enzyme Assay	Online / MS Teams
15.	2 nd Week of December 2021	Bacterial Biosensors - Toxicological Risk Assessments	Online / MS Teams
16.	3 rd Week of December 2021	Improved Bioremediation by Engineering Microbes – Bioadsorbents.	Online / MS Teams
17.	4 th Week of December 2021	Metal Precipitation – Enzymatic Transformation of Metals.	Online / MS Teams
18.	5 th Week of December 2021	Final Assessment	Online / MS Teams



COURSE ASSESSMENT METHODS			
S.No.	Mode of Assessment	Duration	% Weightage
1	First Assessment	60 mins	20
2	Second Assessment	60 mins	20
3	Quiz (MCQ), Assignments, & Presentation.		30
5	Final Assessment	120 mins	30
	Compensation Assessment*	Based on assessment*	Based on assessment*
COURSE EXIT SURVEY			
<ul style="list-style-type: none"> • Direct feedback from the students by face-to-face meeting as a whole. • Feedback from the students during class committee meetings • Exit survey from the students at the end of the session 			
COURSE POLICY			
<ul style="list-style-type: none"> • Attending all the assessments (Assessment 1 to 5) is MANDATORY for every student • If any student is not able to attend Assessment-1 / Assessment-2/ Assessment-3 due to genuine reason, student is permitted to attend the respective assessment as compensation assessment (CPA) with the same weightage. Prior permission and required document must be submitted for absence. • At any case, CPA will not be considered as an improvement test. A minimum of 30% should be scored in the end assessment for a pass. • Every student is expected to score minimum 35% or class average/2(whichever is greater) to pass the course. Otherwise the student would be declared fail and 'F' grade will be awarded 			
ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)			
<ul style="list-style-type: none"> ➤ At least 75% attendance in each course is mandatory. ➤ A maximum of 10% shall be allowed under On Duty (OD) category. ➤ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade. 			



ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.


Plagiarism means knowingly presenting another person's ideas, findings or work as one's work by copying or reproducing them without due acknowledgement of the source, with intent to deceive the examiner into believing that the content is original to the student.

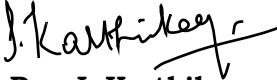
Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e. their intellectual property) so used as one's own work


ADDITIONAL COURSE INFORMATION

- All the students are advised to check their NIT-T webmail regularly to know the updates. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be communicated through webmail or MS Teams.
- Queries / Clarifications / Discussions (if required) may be E-mailed to me / contact me during working hours (4.00 PM to 5.00 pm) from Monday to Thursday with prior intimation.

FOR APPROVAL


Dr. Yukesh Kannah R
Course Faculty


Dr. J. Karthikeyan
Chairman (Class Committee)


Dr. G. Swaminathan
HoD / Civil Engineering
Head
Department of Civil Engineering
National Institute of Technology
Tiruchirappalli - 620 015.