



Course Syllabus
Gyanmanjaris Science Colleges
Semester-I(M.Sc.)

Subject: Environmental Pollution and Biotechnology- MSCMB11504

Type of course: Major

Prerequisite: These courses provide students with foundation knowledge of the biological sciences and environmental sciences that are necessary to understand the potential of biotechnology, students can be empowered to use it to make a positive impact on the world.

Rationale: To teach students about the principles of biotechnology and how it can be used to address a wide range of challenges, from environmental pollution to food security to health care.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks					Total Marks
CI	T	P		Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.



Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Presentation Faculty will assign topics and students will prepare presentations (Slideshow/video) and upload them to Moodle.	10
2	Field Survey Students have to visit the field, collect the data related to the topic and the survey done by the students. Students have to upload on the moodle.	10
3	Theme based poster Faculty will provide specific theme to students and students will prepare specific theme based poster.	10
4	Paper Review Faculty will provide a particular portion of the research paper and a group of students will review it and prepare a conclusion in 100 words and upload it to Moodle.	10
5	Chain notes Faculty will provide a topic on that students have to prepare a series based on topic in chart form in hard copy and upload it to moodle.	10
Total		30

Course Content:

Unit No	Course content	Hrs	% Weightage
1	<p>Chapter: 1-Pollution</p> <ul style="list-style-type: none"> Water Pollution: International efforts to tackle environmental pollution. Pollution of water and treatment of polluted waters. Soil pollution: Causes, Effects, Control. Water Pollution: Oxides of carbon, other green house gases, ozone, sulphur dioxide, oxides of nitrogen, hydrocarbons and particulate air pollution. Central control devices for air pollution. Noise Pollution: Causes, Effects, Control. 	15	25



2	<p>Chapter:2-Biotechnology</p> <ul style="list-style-type: none"> • Recombinant DNA Technology (Genetic Engineering). • Enzymes used in RDT: Restriction enzymes, Reverse transcriptase, DNA ligase, DNA polymerase, Alkaline phosphatase, Ribonuclease-H, Kinase. • Transgenic Plants, Organisms and Animals 	15	25
3	<p>Chapter:3-Vectors and Probes</p> <ul style="list-style-type: none"> • Plasmids, Cosmids, Phagemids, Phages, Artificial chromosomes (BACs, YACs, HAC/MAC) • Methods of introduction of r-DNA into host cell • Expression and characterization of cloned genes • Oligonucleotide probes and labelling of probes 	15	25
4	<p>Chapter:4-Molecular markers and techniques:</p> <ul style="list-style-type: none"> • Blotting and hybridization techniques • DNA sequencing • DNA fingerprinting • Molecular markers- RFLP and RAPD • Microarray technique • PCR methods and applications. • Sitedirected mutagenesis, oligonucleotide directed mutagenesis 	15	25

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.



Course Outcome:

After learning the course the students should be able to:	
CO1	Aware of pollution sources and its effect on ecosystems.
CO2	Get knowledge about Genetic Engineering and Biotechnology.
CO3	Learn techniques used for genetic manipulation in microbes.
CO4	Learn about techniques to identify and analyze Molecular markers.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

- 1) Analysis of Genes and Genomes by Recharl Reece.
- 2) Biotechnology by P. K. Gupta.
- 3) Environmental biotechnology by S. K. Agarwal.
- 4) Environmental biology by P. S. Verma.
- 5) Recombinant DNA techniques by Rodriguez & Tait.

