

GUJARAT TECHNOLOGICAL UNIVERSITY

School of Applied Sciences and Technology

Integrated M.Sc. Biotechnology

AGRICULTURE BIOTECHNOLOGY

Prerequisite:

Students should have knowledge about basic microbiology, plant physiology, biochemistry and molecular biology and techniques used in molecular biology.

Rationale:

Agricultural biotechnology includes scientific techniques for improvement of plants and microorganisms at DNA level. Gaining knowledge on this subject will help the student to know about the development of new crops.

Course Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	P	C	Theory		Tutorial/ Practical		
				University exams (ESE)	Progressive Assessment (PA)	External Practical /viva Exam(ESE)	Internal evaluation Practical /viva Exam(PA)	
4	0	0	4	70	30	0	0	100

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	Introduction to Agricultural biotechnology Soil nutrition for the plant growth, Physical chemical properties of soil, Major Problems due to Abiotic and Biotic stress, application Agricultural biotechnology	8	13
2	Plant breeding Introduction to Plant Breeding, history of Plant Breeding, Conventional Plant breeding Techniques; Use of induced mutation in Plant Breeding, Molecular marker aided breeding, DNA molecular markers: Principles, type and applications (RFLP, RAPD, AFLP etc.), Marker assisted selection , IPR related to plant breeding	12	20
3	Biofertilizer, Biofungicides and Biopesticides Concept of plant growth promoting bacteria and organic farming, Use of microorganisms as	15	25

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	biofertilizers, Types of biofertilizers, composts, mechanisms and methods of application of biofertilizers, field performance of biofertilizers, method of application Plant diseases caused by microbes, Microorganisms used as Biofungicides and Biopesticides, quality control and Indian Standards for biofertilizers and biopesticides.		
4	Concepts of soil microbiology Soil structure and composition: Soil physico-chemical properties, soil organic matter and humus. Soil fertility: Soil microbial communities, role of soil microorganisms in composting, humus formation and mineralization of cellulose and lignin. Rhizosphere: Rhizosphere effect, nutrient exchange, rhizosphere microbes and their significance.	15	25
5	Application of Genetically Modified Plants for crop improvement Application of plant transformation for productivity and performance, Development of Biotic and Abiotic stress resistance in plants, Delay of fruit ripening; improvement in oil quality trait etc. Molecular farming: Production of antibodies, polymers, vaccines and Bioplastics.	10	17
Total Hours:		60	

Textbook:

1. Plant Pathology, Mehrotra R and Aggarwal A, (2003), 2nd edn, Tata Mcgraw-Hill Publisher
2. Agricultural Biotechnology (Books in Soils, Plants, and the Environment 1997 by Arie Altman

Reference Books:

1. Agricultural Microbiology by G. Rangaswami and D. Bagyaraj
2. Plant Biotechnology by B D singh
3. Plant Biotechnology by HS Chawla
4. Text Book of Microbiology by R.C. Dubey

Course Outcomes:

No.	Course Outcomes	RBT Level*
1	Deep Understanding of Agriculture	UN,RM,AP,AN,EV,CR

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	Biotechnology	
2	Importance of soil microbe interaction	UN,RM,AP,AN,EV,CR
3	Students can start their own startup in agribiotech industry	UN,RM,AP,AN,EV,CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List:

Not Applicable

List of Laboratory/Learning Resources Required

1. <https://courseware.cutm.ac.in/courses/certificate-course-bio-fertilizer-preparation/>
2. http://plantbreedingfordroughttolerance.colostate.edu/online_course.html