

INSTITUTE	FACULTY OF AGRICULTURE
PROGRAM	BACHELOR OF SCIENCE (Hons.) AGRICULTURE
SEMESTER	5
COURSE TITLE	INTRODUCTORY BIOTECHNOLOGY
COURSE CODE	16AS0504
COURSE CREDITS	2

Objective:

- 1 To understand the basic concepts of biotechnology and molecular biology used in the crop improvement.
- 2 To impart the knowledge on various techniques utilized in plant biotechnology like tissue culture, genetic transformation and their application in crop improvement.

Course Outcomes: After completion of this course, student will be able to:

- 1 Students will be able to know the structure, function and metabolism of bio-molecules present in the plants.
- 2 Students will be able to describe the principle and theory of various molecular biology techniques used for the improvement of crops.
- 3 Students will be able to demonstrate techniques utilized in plant biotechnology and plant tissue culture.
- 4 Students will be able to calculate the various parameters to elucidate enzyme activity of the given sample.

Pre-requisite of course: To provide knowledge about various biotechnological techniques of agriculture.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
1	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	1 History of Biotechnology, Concepts and applications of plant biotechnology	2
2	2 Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications	2

Contents : Unit	Topics	Contact Hours
3	3 Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance	2
4	4 Embryo rescue and its significance	2
5	5 somatic hybridization and cybrids	1
6	6 Somaclonal variation and its use in crop improvement; cryo-preservation	2
7	7 Concept of central dogoma; DNA replication, Transcription and Translation	2
8	8 Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods	1
9	9 Transgenics and its importance in crop improvement	1
10	10 PCR techniques and its applications; RFLP, RAPD, SSR	1
11	11 Marker Assisted Breeding in crop improvement; Biotechnology regulations	1
Total Hours		17

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	1 Requirements for plant tissue culture and biotechnology laboratory	2
2	2 Sterilization Techniques	2
3	3 Composition of tissue culture media	2
4	4 Callus induction for various explants	2
5	5 Micropropagation of important crops	2
6	6 Hardening and acclimatization of regenerated plants	2
7	7 Demonstration of isolation of DNA	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
8	8 Quantification of Nucleic acids	2
9	9 Demonstration of Agarose Gel Electrophoresis	2
10	10 PCR and DNA Fingerprinting	2
Total Hours		20

Textbook :

- 1 NA, NA, NA, NA

References:

- 1 Biotechnology and Genomics, Biotechnology and Genomics, Gupta, P.K, Rastogi Publications, 2006
- 2 Genes VIII, Genes VIII, Lewin, B, Oxford University Press, 2004
- 3 Conservation of Plant Genes, DNA Banking and In Vitro Technology, Conservation of Plant Genes, DNA Banking and In Vitro Technology, Adams, R.P. and Adams, J. E. (eds.), Academic Press, 1992
- 4 Plant Tissue Culture: Applications and Limitations, Plant Tissue Culture: Applications and Limitations, Bhojwani, S.S. (eds.), Elsevier, Amsterdam., 1990

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
25.00	25.00	20.00	10.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-rooms
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.