

Course Code : BIT 401

Course Title : Introductory Biotechnology and Biodiversity

Credit Hours : 2 (2 + 0) Full Marks: 50 Theory: 50 Practical: 0

OBJECTIVES

Upon the completion of this course, the students will be able to understand the basic concepts of biotechnology and biodiversity.

I. SYLLABUS

Biotechnology: Introduction to biotechnology; Plant biotechnology; Genetic engineering and gene cloning; Plant cell and tissue culture; Applications of tissue culture for crop improvement; Polymerase chain reaction and gel electrophoresis; Molecular markers and Marker assisted selection.

Biodiversity: Introduction to biodiversity; Database and biodiversity indexing; Species and genetic diversity and centres of diversity of crops and wild genetic diversity; Conservation of biodiversity.

II. COURSE OUTLINE

A. Lecture

S. N.	Topics	No. of Lectures
A. Biotechnology		
1.	Introduction to biotechnology	2
	1.1 Definition, history and fields of biotechnology	
	1.2 Current activities and future scope of biotechnology in the context of Nepal	
2.	Plant biotechnology (definition, types, relationship to other disciplines, future scope of plant biotechnology in the context of Nepal)	1
3.	Genetic engineering and gene cloning	5
	3.1 Restriction enzymes and its types	
	3.2 Definition, history, basic steps involved and methods of genetic engineering	
	3.3 Gene cloning vectors	
	3.4 Methods of gene cloning	
	3.5 Applications of genetic engineering in the field of crop improvement	
4.	Plant cell and tissue culture	4
	4.1 Definition, history, basic steps/techniques and types of tissue culture	
	4.2 Callus, cell suspension and protoplast culture	
	4.3 Anther/pollen culture	
	4.4 Meristem and embryo culture	

5.	Applications of tissue culture for crop improvement	4
5.1	Haploid and triploid production, invitro pollination and fertilization	
5.2	Somatic hybridization and cybridization	
5.3	Genetic transformation and wide hybridization	
5.4	Somaclonal/gametoclonal variants selection, production of pathogen free plant	
6.	Polymerase chain reaction and Gel electrophoresis	1
7.	Molecular markers and marker assisted selection	3
7.1	Molecular markers	
7.2	Marker assisted selection (MAS) and mapping strategy	
7.3	Applications of molecular markers/MAS	

B. Biodiversity

8.	Introduction to biodiversity	3
8.1	Basic concepts and aim of biodiversity; familiar to some terms: alpha, beta, gamma, guild and endemic diversity	
8.2	Scope and factors affecting biodiversity	
8.3	Biological hierarchy of biodiversity (genes-populations-species-communities-ecosystems-landscapes-biosphere)	
9.	Database and biodiversity indexing	2
9.1	Database	
9.2	Biodiversity indexing	
10.	Genetic diversity and centers of diversity of crops	2
10.1	Species and genetic diversity; wild genetic diversity of some important crops	
10.2	Centres of diversity of crops	
11.	Germplasm collection, conservation and utilization	3
11.1	Concept of conservation: Ex-situ and in-situ conservation	
11.2	Risk of extinction and Recovery program	
11.3	National legislation and intellectual property rights, conflict and nature of policies	
Total		30

REFERENCES

- Chaudhary, R.P., 1998. Biodiversity in Nepal: Status and Conservation. S. Devi. Sharanpur. India.
- Ignacimuthu, S. 1996. Basic Biotechnology. Tata McGraw Hill Publishing Company Limited. India.
- Jha, P.K., G.P.S. Ghimire, S.B. Karmacharya, S.R. Baral and P. Lacoul. 1996. Environment and Biodiversity. ECOS (Nepal). Kathmandu. Nepal.
- Mascarenhas, A.F., 1997. HandBook of Plant Tissue Culture. Indian Council of Agriculture Research. New Delhi. India.
- Pareek, L.K. and P.L. Swamkar. 1997. Trends in Plant Tissue Culture and Biotechnology. Agro Botanical Publishers. India.