

5.	Process and products of evolutionary change: (Population genetics, Natural selection, Species concept and modes of speciation.)	8
	TOTAL	42

Books: -

S. No.	Name of Books/ Author/Publisher
1	Environmental studies Benny Joseph-Tata Mc Graw Hill
2	Rana. S.V.S., —Essentials of Ecology & Environment Science, PHI Publications.
3	Ridley, M. Evolution. III Edition. Blackwell Publishing
4	Barton, N. H., Briggs, D.E.G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. Evolution. Cold Spring Harbour Laboratory Press
5	Hall, B.K. and Hallgrímsson, B. Evolution. IV Edition. Jones and Bartlett Publishers

Transgenic Technology

Details of course: -

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Transgenic Technology (BT314)	3	1	0	NIL

Course Objective:

This course describes the methodology for generation of transformants and applications of transgenics.

Course Outcome:

- 1 Compare different types of vectors – bacterial, plant and animal and the method of transformation of vectors.
- 2 Discuss nuclear transfer, therapeutic cloning, gene targeting and their application.
- 3 Outline the production of recombinant biopharmaceuticals, learning improved production of alcohol, fructose and glycerol.
- 4 Discuss transgenic technology in plant and agriculture and list the applications, developing plants with improved quality.
- 5 List biosafety guidelines for the recombinant DNA, and implementation of this by national regulatory mechanism for handling GMOs.

S. No.	Content	Contact Hours
1.	Basics of Recombinant DNA Technology: Bacterial, plant and animal vectors; Methods of bacterial, plant and animal transformation	8
2.	Techniques Related to Generation and Applications of Transgenics: Nuclear transfer technologies; Reproductive and therapeutic cloning; Gene therapy; Gene targeting; Gene editing; Use of recombinase in transgenic construction; Application of Cre recombinase, Flippase, Zinc finger nucleases and Transcription activator-like effector nuclease; Recombinase mediated gene stacking; Design of vectors for optimizing transgene expression; Analysis of phenotype and transgene expression; Databases	8
3.	Recombinant Microorganisms: Production of recombinant biopharmaceuticals, restriction enzymes, antibiotics, Small molecules, biopolymers, recombinant vaccines; Biopesticides; Improved production of alcohol, fructose, glycerol; Improved conversion of glucose to fructose; Efficient utilization of cellulose; Plant growth promotion; Bioremediation, Superbug	9
4.	Plant and Animal Transgenics: Plant transgenics: Applications of transgenic technology in agriculture; Development of plants with improved quality attributes; Phytoremediation; Bioenergy plants; Plants as bioreactors; Edible vaccines; Animal transgenics: Application as basic research models and bioreactors; Application in molecular pharming, DNA vaccines, human gene medicines; stem cell therapy	9
5.	Regulation and Public Concerns: Recombinant DNA biosafety guidelines; National regulatory mechanism for implementation of biosafety guidelines for handling GMOs; Commercialization; Public acceptance; Risk factors related to transgenic plants and animals – health, environmental, ecological, socio-economical safety and ethical issues; Bt cotton case study; Concerns and regulations related to stem cell research and human cloning	8
TOTAL		42

Books: -

S. No.	Name of Books/ Author/Publisher
1	Molecular Biotechnology by Glick, B.R. and Pasternak, ASM Press, USA
2	Molecular Cloning: A Laboratory Manual (3 Volume Set) by J. Sambrook and David W. Russel. Third edition. Cold Spring Harbor Laboratory Press
3	Genetic Engineering by Rastogi, S. and Pathak, N. Oxford University Press
4	Principles of Gene Manipulation and Genomics Primrose, S.B. and Twyman, R.