

Course Code	Course Title	L	T	P	C
BABIT311	Animal Biotechnology	3	1	0	4
Pre-requisite	BABIT207 - Genetic Engineering	Syllabus Version			
		1			
Course Objectives					
1. Recall the important aspects of animal cell culture 2. Learn best methodologies for the characterization of animal cell lines 3. Genetic modification techniques in animal cells and embryos					
Course Outcomes					
1. Explain the concepts of animal cell culture and their applications 2. Compare strengths and limitations of different genetic modification procedures in animal cells. 3. Apply the fundamental knowledge of breeding and genetic modification- related technologies in laboratory, farm animals and wildlife conservation 4. Use different animal models in understanding human disease and use them for research as well as drug development process 5. Obtain holistic perspective of the ethical, legal and social aspects of use of animals for research purposes					
Module:1	Animal Cell Culture and Applications	9 hours			
Importance of animal cell culture media; Primary and secondary cell culture; Cell Immortalization techniques; Scaling up of animal cell culture; Immobilization of cells; Cell line characterization and managing contaminants in culture; Cryopreservation; Application of animal cell culture for in vitro testing of drugs; Animal Cell culture derived human and animal viral vaccines and pharmaceutical proteins; Stem cell technology; CRISPR-Cas9 technology and applications.					
Module:2	Genetic Modification Techniques in Animal Cells	9 hours			
Methods and efficiency in gene transfer: Biological methods (Viral mediated - Adeno- and Retro-viruses); Transient and stable transgene expression in cells; Selectable markers and their mode of action in animal cells; Cellular gene silencing: siRNA and shRNA technique; Gene editing: Meganucleases, TALEN, ZFN, and CRISPR-Cas9					
Module:3	Genetic Modification Techniques in Lab Animals	8 hours			
Production and breeding of Transgenic; Knock out mice by Cre-LoxP; Constitutive and inducible expression of transgenes in animals; Animal genome projects; Cloning and gene manipulations in conservation of wild animals.					
Module:4	Animal Breeding Methods for Better Traits in Farm Animals	8 hours			

Cryopreservation of sperms and ova of livestock; Artificial insemination-estrous synchronization; Super-ovulation; Embryo transfer, Immunological methods to control reproduction; Monitoring reproductive status, in vitro fertilization; Prenatal genetic testing.		
Module:5	Ethical Legal and Social Implications of Animal Biotechnology	9 hours
Functional studies; Therapeutic production; disease modeling types and methods; Genetically modified animal models used in biomedical research (Cancer, Diabetes and Immunology); Ethical, Legal and social implications of animal biotechnology and genetically modified animals.		
Module:6	Contemporary Topics	2 hours
Total Lecture Hours:		45 hours
Tutorial Hours:		15 hours
Text Book(s)		
Bernard R. Glick and Cheryl L. Patten. , " Molecular biotechnology : principles and applications of recombinant DNA ", Washington ASM Press USA, 5 th Edition, 2017 Sandy Primrose and Richard Twyman. , " Principles of Gene Manipulation and Genomics ", Wiley Blackwell publishing Oxford UK, 8 th Edition, 2016		
Reference Books		
Ian Gordon, " Reproductive Technologies in Farm Animals ", CABI Publishers Cambridge USA, 2 nd Edition, 2017 R Ian Freshney, Amanda Capes-Davis, Carl Gregory, and Stefan Przyborski , " Culture of Animal Cells: A manual of basic technique, and specialized applications ", Wiley Blackwell New Jersey, 7 th Edition, 2016		
Mode of Evaluation :Continuous Assessment Test, Digital Assignment, Quiz, Final Assessment Test, Seminar, Presentaion		
Recommended by Board of Studies :		26-05-2025
Approved by Academic Council : No. 78		12-06-2025