



AMITY UNIVERSITY

UTTAR PRADESH

FORMAT FOR COURSE CURRICULUM

Course Title: Animal Biotechnology

Credit Units: 03

Course Level:UG

Course Code: BIOT211

L	T	P/ S	SW/FW	No. of PSDA	TOTAL CREDIT UNITS
2	-	2	0	0	03

Course Objectives:

Theory: It aims to provide an understanding of animal cell culture with special emphasis on its applications like *in vitro* maintenance of cell lines.

Practical: To provide training about the experimental apparatus regarding basic concept of animal cell culture involving initiation and maintenance of cell lines along with cytotoxicity.

Pre-requisites: Basic knowledge of animal physiology, cell biology, molecular biology and recombinant DNA technology.

Module I: Introduction to Animal Cell Culture	20% Weightage
<ul style="list-style-type: none"> • Historical perspectives • Sterilization Methods • Introduction to different types of animal cell culture - adherent, suspension and immobilized cell cultures • Organ culture and its types - plasma clot, raft methods, agar gel, grid and other methods • Introduction to Organ and Tissue engineering 	
Module II: Cell Culture Maintenance and Preservation	10% Weightage
<ul style="list-style-type: none"> • Cell culture vessels • Culture media - Natural and artificial media, serum-containing and serum free tissue culture media • Initiation and maintenance of primary culture and cell lines • Cryopreservation techniques 	

Module III: Applications of Animal Cell Culture	20% Weightage
<ul style="list-style-type: none"> Hybridoma technology <i>In vitro</i> fertilization and its applications <i>In vitro</i> production of biomolecules of commercial significance 	
Module IV: Gene Transfer: Tools and Methods	30% Weightage
<ul style="list-style-type: none"> Gene transfer methods Introduction to animal vectors Virus-mediated gene transfer-Use of specific vectors like Retrovirus, SV 40, Adeno-virus and Adeno-associated virus to express genes in cell lines Physical methods - Microinjection, Electroporation, Gene gun method Chemical methods - Calcium phosphate method and Liposome-mediated gene transfer 	
Module V: Transgenic Animals	20% Weightage
<ul style="list-style-type: none"> Applications of Transgenic animals with new traits Transgenic animals as bioreactors for the production of pharmaceutically and therapeutically important biomolecules Bioethical issues related to animal biotechnology 	
List of Experiments	
<ul style="list-style-type: none"> Introduction to the lay-out of Animal Cell Culture Lab General Methods of surface, glasswares and instrument sterilization Preparation of animal tissue culture media and its sterilization Inoculation of cell line in culture, subculture and its maintenance Counting of cells using Haemocytometer 	

Course Learning Outcomes: After completing this course, the student will be able to:

- Demonstrate** a clear understanding of concepts related to animal tissue culture technique and its applications.
- Integrate** and **apply** their understanding in pharmaceutical and biotechnology industry applications.
- Analyze** different prerequisites for animal cell and tissue culture.
- Analyze** cultured animal cells and monitor the growth & progress of cells grown *in vitro*.
- Demonstrate**, by performance, the basic laboratory mathematics necessary to perform tests, make dilutions, and prepare solutions
- Perform** media preparation and adherent cell culture.

Pedagogy for Course Delivery:

Lectures: 27

Presentation/ Seminar/Quiz: 1

Class Test: 2

Total-30

Lab/ Practical details, if applicable:

Practical: 28

Class Test: 2

Total: 30

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total (%)
75	25	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment (50 %)					End Term Examination (50%)
Components (Drop down)	Class test (2)	Assignments	Quiz	Attendance	
Weightage (%)	20	15	10	5	50

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment (50 %)					End Term Examination (50%)		
Components (Drop down)	Lab. /virtual Performance	Viva-Voce	Attendance	Quiz on lab safety	Lab/E-record	Lab. Performance	Viva-voce	Lab Records
Weightage (%)	25	10	5	5	5	30	10	10

Text Books:

- Animal Cell and Tissue Culture (1st Edition) by Shivangi Mathur. Publisher: Agrobios (India), 2009.
- Animal Biotechnology (3rd Edition) by M. M. Ranga. Publisher: Agrobios (India), 2007.
- Animal Biotechnology by Varun Mehta. Publisher: Campus Book International, 2011.

Laboratory Manual:

- Laboratory Manual for Biotechnology (1st Edition) by Ashish S. Verma, Surajit Das, and Anchal Singh. Publisher: S. Chand, New Delhi, 2014.

References Books:

- Culture of Animal Cells: A Manual of Basic Technique & Specialized Applications (6th Edition)-R. Ian Freshney. John Willey & Sons Inc, USA, 2010.
- Animal Cell Culture and Technology (2nd Edition) by Michael Butler. BIOS Scientific Publications Ltd, 2004.
- Molecular Cloning: A Laboratory Manual (4th Edition) by Michael R. Green and Joseph Sambrook. Cold Spring Harbor Laboratory Press, USA, 2012.
- Animal Biotechnology-Models in Discovery and Translation (1st Edition), Editors: Ashish S. Verma and Anchal Singh, Elsevier 2014.