

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
INSTRUCTION DIVISION
First Semester 2015-2016
(Course Handout Part II)

Dated: 03/08/ 2015

In addition to part I (general handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No : BIO G524
Course Title : Animal Cell Technology
Instructor-In charge : SANJEEV KUMAR
Instructors : A.K. Das, Mithlesh Kajla

1. Course Description: Animal cell and tissue culture from various organisms, types of cell lines, development and maintenance of cell lines, manipulation and applications of cell culture technology for Biotechnological research and therapeutics implication.

2. Scope and objective of the course: This course will enable students to increase their knowledge in recent advances in animal cell and tissue culture technology both theoretically and practically. The knowledge of this area is important to understand the modern *in vitro* research related to the biology of the cell. In addition, cell genetic manipulations and their implications in human life. The major biotechnological advances include *in vitro* maintenance of cell microenvironment, proliferation and large scale propagation, cryopreservation, cell transformation, 3D culture, cytotoxicity, stable transfection and production of therapeutic agents and Bioengineering.

3. Text Books:

Freshney, R.I. Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications, Willey-Blackwell Press (6th Ed), 2010.

4. Reference books:

R1: Asok Mukhopadhyay. Animal Cell Technology. I. K. International Publishing House Pvt. Ltd. 2009.

R2: R. M. Twyman. Gene transfer to animal cells. Taylor & Francis group, 2008.

5. Course plan:

Lec. No.	Learning objectives	Contents	References@ (Chapters)
1-2	Introduction	Types of culture, advantages and limitations of tissue culture.	1 (TB), Class notes
3-4	Biology of cultured cells	General characteristics of cells in culture microenvironment.	2 (TB)
5-6	Bio safety and lab ethics	Basic lab exercises, laboratory safety and ethics.	6 (TB) 6 (RB1)
7-8	Laboratory design and equipments	Designing of animal tissue culture laboratory, common and specialized equipments, consumable items.	3, 4, 7 (TB) 6 (RB1)
9-11	Sterilization	Aseptic techniques, sterilization.	5, 10 (TB) 6 (RB1)
12-13	Culture media	Defined media and supplements, serum-free medium.	8, 9 (TB) 5 (RB1)
14-16	Primary culture	Types of primary cell cultures, isolation of tissue, primary culture. Environmental factors and cell	11 (TB) 3, 7 (RB1)

		culture process.	
17-18	Subculture and cloning	Subculture, cloning, isolation of clones.	12, 13 (TB)
19-21	Cell characterization and transformation	Characterizing cells in the culture, transformation, immortalization, tumorigenicity.	15, 17 (TB)
22-23	Contamination	Source of contamination, monitoring and eradication of contamination.	18 (TB)
24-25	Cytotoxicity	Markers for cell viability and apoptosis. Viability and cytotoxicity assays.	21 (TB) 2, 9 (RB1)
26-28	Cell culture of specialized cells and 3D culture	Culture conditions for specific (Differentiated, non differentiated and tumor) cells. Organ, histotypic and organotypic cultures.	22, 23, 24, 25 (TB) 13 (RB1)
29-30	Cryopreservation	Rational and principles for cell cryopreservation, Thawing and recovery of frozen cells.	19 (TB) 4 (RB1)
31-34	Specialized techniques and implications of cell culture	Viable cell separation and quantitation, differentiation, Confocal microscopy, <i>in situ</i> hybridization, somatic cell fusion, monoclonals, microcarriers, scale up and automation.	14, 16, 20, 26, 27 (TB) 2, 7, 8, 9 12, 14 (RB1) Class notes
35-38	Therapeutics implications of cell culture and Bioengineering	Stable gene expression in mammalian cells and methods of DNA transfer. Bioreactors, Tissue engineering	10, 11, 14, 15 (RB1) Class notes
39-41	Genetic manipulation of experimental animals	Various methods of genetic manipulation, Producing genetically-engineered animals	5 (RB2) and class notes

@ Class notes will also be included.

Lab Plan: Experiment related details/protocols will be provided separately in the laboratory hours.

Evaluation scheme:

Component	Duration	Weightage %	Date and time	Venue	Remarks
Mid Semester test	90 mins	20	5/10 10:00 - 11:30 AM		CB
Quizzes		10			CB
Experiments, Lab assignments and lab quiz		20			Partly OB
Research Oriented Assignment/seminars		10			OB
Comprehensive	3 hrs	40	1/12 AN		Partly OB

6. Chamber consultation hour: To be announced in the class.

7. Notices: All notices will be displayed on the Biological Sciences Group notice board.

8. Make-up Policy: Make-up will be granted only for hospitalization or genuine cases certified by concerned Wardens and/or medical officers. No make-up will be considered for quizzes, seminars and lab assignments.

Instructor-in-charge

