

Lovely Professional University, Punjab

FORMAT FOR INSTRUCTION PLAN (for Courses with Lectures with or without Labs)

Term: V

Course No. BTY 305

Course Title: Concepts in Animal Biotechnology

L: 3 T: 0 P: 2 Cr: 4

Text Books: 1. Culture of Animal Cells, A Manual of Basic Technique, R Ian Freshney, John Wiley & Sons, 2005, Fourth edition

Other Books:

2. Animal Biotechnology by Srivastava Ak, Singh Rk, Yadav Mp.2004, Second edition
3. Animal Cell Biotechnology by R. E. Spier, J. B. Griffiths, Raymond E. Spier, 2005, Second edition
4. Animal Biotechnology: by Florence Periera Raja, 2003, Third edition

S.No.	Journal articles as compulsory readings (Specific articles, <i>Complete reference</i>)
5	Complete replication of Hepatitis C virus in cell culture http://www.sciencemag.org/cgi/reprint/309/5734/623.pdf
6	Transepithelial transport in cell culture http://www.pnas.org/content/73/4/1212.full.pdf
7	http://www.uchsc.edu/safety/Downloads/NIH-OBAFAQsOnTransgenicAnimalsAndUseOfrDNAinAnimals.pdf (Transgenic animals and the use of recombinant DNA in animals and Application of Animal biotechnology)
8	http://dbtbiosafety.nic.in/guideline/OACD/Recombinant_DNA_safety_considerations.pdf (Recombinant DNA Safety considerations)

Relevant websites:

S.No.	Web address (<i>Exact page address</i>)	Salient Features
9	http://www.informaworld.com/smpp/title~content=t713597228~db=all	Current trends in animal biotech
10	http://jinfo.lub.lu.se/jinfo?func=fullRecord&jld=11987&issn=10495398	Recent developments in animal biotechnology
11	http://www.ripublication.com/ijbb.htm	New discoveries in animal biotechnology

Note : Serial no. of text book , other specific books , other readings and websites should be in continuity and can go to any number, as illustrated in the format.

Detailed Plan for Lectures

Week No.	Lecture No.	Topic	Chapters/ Sections of Textbook/ other reference ¹	Homework to be assigned to students ³	Pedagogical tool Demonstration/ case study/ images/ animations etc. planned ⁴	Pedagogical tool Demonstration/ case study/ images/ animations etc. actually used	Date Delivered ² (Mention Regular (R) / Make Up (M) class)
Part 1 (one fourth of total number of lectures)							
1	1	Introduction to Animal Biotechnology,	1/1, (1-8)		http://www.corning.com/Lifesciences/technical_information/techDocs/intro_animal_cell_culture.pdf		
1	2	Future perspectives of animal Biotechnology					
1	3	Job perspectives in Animal Biotechnology		DoA-1			
2	4	Organizations offering higher courses in Animal biotechnology					
2	5	New discoveries in animal biotechnology					
2	6	Sterilization techniques-Glass wares	1/11, (145-173)		http://in.youtube.com/watch?v=iG1k8qEyzJs&feature=related		
3	7	Sterilization techniques-Media					
3	8	Sterilization techniques-Reagents					
3	9	Culture vessels and substrates	1/8, (105-113)		http://images.google.co.in/images?hl=en&q=culture%20vessels%20animal%20cell%20culture&um=1&ie=UTF-8&sa=N&tab=wi		
Part 2 (another one fourth of total number of lectures)							
4	10	Biology of Cultured Cells	1/3, (31-42)	DoS-1	http://in.youtube.com/watch?v=2R7IYiuuL-E		
4	11	Biology of Cultured Cells cont.		DoT1			

4	12	Biology of Cultured Cells cont.	1/3, (31-42)	DoA-2	http://in.youtube.com/watch?v=2R7IYiuuL-E		
5	13	Biology of Cultured Cells cont.	1/3, (31-42)				
5	14	Laboratory Design and Layout of an ACC Lab	1/4, (43-51)		Designing by students by preparing charts		
5	15	Equipment requirements of ACC Lab	1/5, (55-72)		http://images.google.co.in/images?hl=en&q=culture%20vessels%20animal%20cell%20culture&um=1&ie=UTF-8&sa=N&tab=wi		
6	16	Safety consideration in ACC lab	1/7, (87-103)		http://dbtbiosafety.nic.in/guideline/OACD/Recombinant_DNA_safety_considerations.pdf , http://in.youtube.com/watch?v=mzr8UJZIKd0		
6	17	Media and supplements of ACC medium	1/9, (115-128)	DoS-2	http://www.springerlink.com/content/n78188411g742t0p/ , http://tools.invitrogen.com/content/sfs/manuals/3949%20Advanced%20media.pdf		
6	18	Revision.		DoT2			

MID TERM EXAM

Part 3 (another one fourth of total number of lectures)

7	19	Serum containing media	1/10, (129-143)	DoA-3			
7	20	Serum free media		DoT, TPA			
7	21	Primary cultures: Anchorage dependent	1/12, (175-197)		http://in.youtube.com/watch?v=7pT33li5A5I		

8	22	Primary cultures: Non Anchorage dependent	1/12, (175-197)				
8	23	Cell Line Subculture	1/13, (199-216)		http://in.youtube.com/watch?v=-MCyN-dB2os		
8	24	Cell Line Propagation	1/13, (199-216)				
9	25	Characterization of Cell Lines	1/15, (199-216)				
9	26	Characterization of Cell Lines cont.					
9	27	Characterization of Cell Lines cont.					
Part 4th (another one fourth of total number of lectures)							
10	28	Characterization of Cell Lines cont.		DoA-4			
10	29	Cryopreservation	1/20, (308-334)		http://in.youtube.com/watch?v=OcsyqZx8igU		
10	30	Measurement of Growth of Cells in culture	1/21, (335-358)		http://www.siyageza.co.za/images/toxicpic5.gif , http://www.astralscientific.com.au/PDFs/Cytotoxicity%20%20Apoptosis%20Assays.pdf		
11	31	Measurement of Viability of Cells in culture					
11	32	Scale up method for propagation of anchorage dependent cultures	1/26, (451-465)		http://www.springerprotocols.com/Abstract/doi/10.1385/0-89603-150-0:49 ,		
11	33	Scale up method for propagation of suspension cultures			http://images.google.co.in/images?hl=en&q=bioreactors&lr=lang_en&um=1&ie=UTF-8&sa=N&tab=wi		
12	34	Bioreactors for Cell Cultures		TPS			
12	35	Bioreactors for Cell Cultures cont.		DoS-4, DoT4			
12	36	Revision					

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Spill over (2*L)

1		Media and supplements					
2		Media and supplements					
3		Media and supplements					
4		ATCC					
5		ATCC					
6		ATCC					

Notes: 1. Use S. No. Of the readings above

2. To be filled in on the date of delivery of lecture by the instructor

3. Put homework number from Homework Table (below) against the lecture in which planned to be assigned (by co-ordinator). The first homework should be planned for the 2nd week of classes and the last should be assigned at least two weeks before the last day of classes.

4. Do not write Lecture, OHP, LCD projector etc.

5. DoA : Ddate of Allotment ; DoS : Date of Submission

Details of Homework and Case Studies Planned:

Homework No.	Topics of the homework	Nature of Homework (Group/individual/fieldwork)	Actual DoA	Actual DoS	Actual date of of task evaluation
1	Introduction to Animal Biotechnology, Sterilization techniques, Culture vessels and substrates, Biology of Cultured Cells	Group			
2	Laboratory Design and Layout of an ACC Lab, Equipment requirements of ACC Lab, Safety consideration in ACC lab Media and supplements of ACC medium, Serum and serum free media	Group			
3	Primary cultures, Cell Lines-Subculture and Propagation, Characterization of Cell Lines	Group			
4	Cryopreservation, Measurement of Growth and Viability of Cells in culture, Scale up, bioreactors, Microcarrier culture	Group			

Term paper to be allotted by lecture no. (should be allotted before the end of 4th week of teaching and should be due at least two weeks before the last day of classes). The term paper should be evaluated before the last day of classes and the marks communicated to the students

All the detailed homework problems to be submitted attached as annexure

Scheme for CA: (out of 100)

Component	Frequency	Marks for each	Total Marks
Homework based tests/quizzes	4(3*)	15	45
Term paper	1	25	25
Lab performance (only if there is a lab component)	Throughout the term	30	30
Any other: specify			

S.No.	Topic
1	15 Institutes working in India and abroad on Animal Cell Culture, details of work carried out in brief.
2	Design the Layout of an Animal Cell Culture Laboratory to be established new for your university.
3	Prepare a list of equipments used in ACC Lab along with their use, price and companies offering.
4	Details for pursuing PhD in Animal Biotechnology from abroad. (Universities offering, fees, ways to apply etc.)
5	Sterilization in Biopharmaceutical processes.
6	Types and Design of Biosafety Cabinets.
7	Biosafety in the Biopharmaceutical Industry.
8	Methods of Quantification of Biomass of Animal Cells.
9	Institutes offering PhD. in Animal Biotechnology and ways to apply.
10	Careers perspectives for a Animal Biotechnologist in India
11	Different Media's used and the companies offering them.
12	Methods to Scale up animal cells in Suspension and Monolayer cultures
13	Different types of Cells that are cultured and routinely used in Animal Biotechnology
14	Significance and Methodology of Cryopreservation in Animal Biotechnology
15	What is Validation? What is its significance in Animal Biotechnology?

Instruction plan for Lab component List of experiments (Should plan for 11 weeks of laboratory, 6 before MTE, 5 after)

Expt. No.	Title*	Equipment /Materials used	Reference of Lab Manual
1	Growth and maintenance of tissue cell lines	Cell Lines, Laminar air flow, Cell culture media, T-25 flasks	
2	Preparation and Sterilization of Media	Autoclave, Glasswares, Media and Reagents, Packing material	
3	Trypsinization method for recovery of cells from monolayer	Trypsin, T-25 flasks, Media, Autoclave	
4	Monolayer culture and subculturing	Trypsin, T-25 flasks, Media, Autoclave	
5	Suspension culture and subculturing	T-25 flasks, Media, Autoclave	
Mid term			
6	Estimation of Viability by Dye exclusion	Trypsin, T-25 flasks, Media, Autoclave, Dye	
7	Enzyme Linked Immunosorbent assay	ELISA Kit, Microtitre plate	
8	Polymerase Chain reaction	PCR machine, PCR kit	
9	Isolation of DNA from animal tissues	DNA isolation kit	
10	Electrophoretic separation of DNA isolated from animal tissues	Electrophoretic assembly	

*Attach for each experiment, the objectives and the complete list of equipment/ consumables required

Plan of experiments: Fill exp number to be performed by each group on each lab turn
(See the note on *Conduct of Laboratory Classes* attached herewith)

Lab. Turn	Date	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10
1.											
2.											
3.											
4.											
5.											
6.											
7.											
8.											
9.											
10.											

Prepared By: Mr. Gaurav Rai

Signature:

Comments of Coordinator of Specialisation (COS) wherever this designation exists/ CoD-F (if any)

Comments of HoD-F / HOF (if there is no HOD-F)