



Master of Science (Biotechnology)  
M.Sc. (Biotechnology) Semester (II)

Course Code	PS02CBIT51	Title of the Course	Animal Biotechnology
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<p>Students should be able to :</p> <p>(1) Maintain subculture and cell lines</p> <p>(2) Understand the pharmaceutical importance and toxicological aspects of cell culture</p>
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Course Content		
Unit	Description	Weightage* (%)
1.	<p>Introduction to animal tissue culture (Background, Advantages and limitations of tissue culture, major differences between in vivo and in vitro, types of tissue culture)</p> <p>Biology of cultured cells (Brief description on cell adhesion, cell proliferation, energy metabolism and origin of cultured cells)</p> <p>General out-line of cell types (epithelial tissue, connective tissue, muscular tissue and nervous tissue)</p> <p>Stem cells, germ cells and amniocytes (Culture of embryonic stem cells, culture of amniocytes, applications of stem cells)</p> <p>Aseptic Techniques (Objectives of aseptic techniques, elements of aseptic environment, sterile handling)</p> <p>Sterilization (Different types- dry heat (hot air oven, wet heat (autoclaving), various chemical agents used in sterilization, irradiation techniques (UV and Gamma Ray)</p> <p>Culture of specialized cells (liver, epidermal, astrocytes, testis and ovary)</p>	25
2.	<p>Defined media and supplements (Physicochemical properties, balanced salt solutions, serum, selection of medium and serum)</p> <p>Serum- Free Media (Disadvantages of serum, advantages of Serum-free media, Preparation of serum free media, Animal protein free media)</p> <p>Primary culture (Initiation of primary cell culture, isolation of tissue, types of primary culture, mechanical and enzymatic disaggregation)</p> <p>Sub culture and cell lines (Subculture and propagation, routine maintenance, subculture of monolayer and suspension cultures)</p> <p>Monitoring for contamination- Visible microbial contamination, mycoplasma, Viral contamination, Eradication of contamination</p>	25
3.	Cell cloning and selection (Feeder layer, suspension cloning, separation of clones)	25





	<p>Cell separation (Centrifugation, Antibody based techniques, FACS)</p> <p>Cell differentiation (Stem cell plasticity, markers of differentiation, induction of differentiation, differentiation and malignancy)</p> <p>Transformation and Immortalization (Immortalization with viral genes, Immortalization of human fibroblasts, telomerase induced immortalization, Aberrant growth control, tumorigenicity)</p> <p>Characterization (Need for characterization, characterization based on cell morphology, DNA and RNA content, enzyme activity and antigenic markers)</p>	
4.	<p>Animal reproductive biotechnology: artificial insemination, super ovulation, embryo recovery and in vitro fertilization, ISCI, ZIFT, GIFT, 3 D culture and Idmoc, culture and cryopreservation of embryos, applications of transgenic animal biotechnology; animal cloning- basic concept, cloning for conservation of endangered species.</p> <p>Vaccinology: conventional methods of animal vaccine production, recombinant approaches to vaccine production, modern vaccines.</p>	25

Teaching-Learning Methodology	<p>Topics will be taught and discussed in interactive sessions using conventional black board and chalk as well as ICT tools such as power point presentations and videos. Practical sessions will be conducted in a suitably equipped laboratory either individually or in groups depending on the nature of exercise as well as availability of infrastructure. Course materials will be provided from primary and secondary sources of information.</p>
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Student should be able to maintain and work in animal cell culture as well as vaccine production lab





Suggested References:

Sr. No.	References
1.	Freshney, R. I. (2015). Culture of Animal cells: a manual of basic technique and specialized applications (6 <sup>th</sup> Edn). John Wiley & Sons, Chicago.
2.	Masters, J. R. (2000). Animal Cell Culture: a practical approach (3 <sup>rd</sup> Edn). Oxford University Press, UK.
3.	Davis, J. M. (Ed.) (2000). Animal Cell Culture: essential methods. John Wiley and Sons, UK.
4.	Gilbert, S. F. (2020). Developmental biology. (12 <sup>th</sup> Edn.) Sunderland, Mass: Sinauer Associates.

On-line resources to be used if available as reference material

On-line Resources

Related review articles and research papers

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