SRI VENKATESWARA COLLEGE OF ENGINEERING (AUTONOMOUS)

COURSE DELIVERY PLAN - THEORY

Department of **Biotechnology**	LP: BT18012 Rev. No: 00 Date: 03/01/2024
~~B.E./~~B.Tech~~/M.E/M.Tech~~ : Student Branch B.Tech -Biotechnology Regulation: 2018A PG Specialisation : - Sub. Code / Sub. Name : **BT18012/ ANIMAL BIOTECHNOLOGY** Unit : I	

Unit Syllabus: ANIMAL CELL CULTURE 12

Introduction to basic tissue culture techniques; chemically defined and serum free media; animal cell cultures, their maintenance and preservation; various types of cultures suspension cultures, continuous flow cultures, immobilized cultures; somatic cell fusion; cell cultures as a source of valuable products; organ cultures.

Objective: This course provides the fundamentals of animal cell culture.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction to Animal Biotechnology and its applications, Equipments used in Tissue culture lab	AT1- Ch-1; Pg. 1-45	LCD
2	Basic tissue culture techniques culturing of cells, adherent cells and suspension cells	AT1- Ch-3; Pg. 50-63 R1 – Ch-2; Pg. 32-57	LCD
3	Basic tissue culture techniques common cell lines, aseptic methods	AT1-Ch-5; Pg. 83-91	LCD
4	Chemically defined and serum free media ingredient of media, culture surface	AT1- Ch-3; Pg. 75-93, T1 - Ch-8; Pg. 89-120 R1 – Ch – 4; Pg. 105 - 120	LCD
5	Animal cell cultures Primary and secondary cell lines, Cell culture environment, Safety measures laminar hood.	AT1- Ch-3; Pg. 97-109	LCD
6	Maintenance and preservation of cell cultures freezing media	T1- Pg. 181-191, 297-308, AT1 - Ch-8; Pg. 105-123	LCD
7	Various types of cultures Bioreactors	AT1- Ch-9; Pg. 142-161	LCD
8	Suspension cultures, continuous flow cultures	AT1- Ch -9; Pg. 65-75	LCD
9	Immobilized cultures; somatic cell fusion using PEG	AT1- Ch-3; Pg. 76-90 R1 – Ch-2; Pg. 58-65	LCD
10	Cell cultures as a source of valuable products	AT1 - Ch-3; Pg. 90-109	LCD
11	Cell cultures as a source of valuable products	AT1 - Ch-3; Pg. 90-109	LCD
12	Organ cultures	AT1 – Ch- 3; Pg. 90-109, T1- Ch-22; Pg. 395-406	LCD

Content beyond syllabus covered (if any):

Safety measures, different types of laminar hood, Equipments used in Tissue culture lab.

* Session duration: 50 minutes

Sub. Code / Sub. Name: **BT18012**/ **ANIMAL BIOTECHNOLOGY**

Unit : II

Unit Syllabus : ANIMAL DISEASES AND THEIR DIAGNOSIS **10**

Bacterial and viral diseases in animals; monoclonal antibodies and their use in diagnosis; molecular diagnostic techniques like PCR, *in-situ* hybridization; northern and southern blotting; RFLP.

Objective: This course provides the details of the diagnosis of the various animal diseases .

Session No *	Topics to be covered	Ref	Teaching Aids
13	What is disease? What are the causative microorganisms for animal diseases	Lecture notes	LCD, Blended Learning
14	Bacterial diseases- anthrax, Brucellosis, salmonellosis, leptosiprosis, Tuberculosis kennel cough in animals	Lecture notes	LCD
15	Viral diseases- feline leukemia, foot and mouth diseases, canine distember in animals	Lecture notes	LCD
16	Monoclonal antibodies and their use in diagnosis	AT3 - Ch 17; Pg. 213-219	LCD
17	Monoclonal antibodies use in diagnosis	AT3 - Ch 17; Pg. 213-226	LCD
18	Molecular diagnostic techniques Video 1, Video 2	AT1- Ch 9; Pg. 253-261	LCD, Animated Videos
19	PCR, *in-situ* hybridization	AT1-Ch-8; Pg. 229-232	LCD
20	Northern and southern blotting	AT1- Ch 9; Pg. 255-257	LCD
21	Restricted Fragment Length Polymorphism	AT1-Ch 9; Pg. 257-259	LCD
22	Fungal diseases in animal histoplasmosis, ring worm infection, parasitic infection- coccidian, worm infection with capillaria, *Dirofilaria immitis, Fluke infection* and prions	Lecture notes	LCD

Content beyond syllabus covered (if any): Fungal diseases in animal histoplasmosis, ring worm infection, parasitic infection- coccidian, worm infection with capillaria, *Dirofilaria immitis, Fluke infection* and prions madcow infection, Q fever. serological methods of diagnosis of diseases.

* Session duration: 50 mins

Sub. Code / Sub. Name: **BT18012/ANIMAL BIOTECHNOLOGY**

Unit : III

Unit syllabus: THERAPY OF ANIMAL DISEASES **12**

Recombinant cytokines and their use in the treatment of animal infections; monoclonal antibodies in therapy; vaccines and their applications in animal infections; gene therapy for animal diseases.

Objective: This course provides the fundamentals of therapy of animal infections.

Session No *	Topics to be covered	Ref	Teaching Aids
23	Importance of cytokines and immunological response	AT2- Ch 9; Pg. 155	LCD
24	Production of important Recombinant cytokines and their uses	T2 – Ch 23; Pg. 489 - 508 AT2- Ch 9; Pg. 155-188	LCD
25	Treatment of common animal infections	AT2- Ch 9; Pg. 155-188	LCD
26	Recombinant cytokines and their use in the treatment of animal infections	AT2- Ch 9; Pg. 155-188	LCD
27	What are Monoclonal antibodies and polyclonal abs what are the significance of using monoclonal abs than polyclonal abs	AT3- Ch 17; Pg. 213-219	LCD
28	Principal of raising and production of monoclonal antibodies by different methods	T2 – Ch 3; Pg. 93-122 AT3 -Ch 17; Pg. 213-219	LCD
29	Different products of Monoclonal antibodies in therapy	AT3-Ch 17; Pg. 213-219	LCD
30	What are Vaccines? What is the importance of vaccine. History of vaccines	AT1-Ch 17; Pg. 218-268, AT1- Ch.21; Pg. 369-387	LCD
31	Different types of Vaccines, Attenuated Vaccines, Subunit & Peptide Vaccines, Vector Vaccines, Bacterial Antigen delivery systems	T2 – Ch 21; Pg. 457-474 AT1- Ch 10; Pg. 321-329	LCD, Plickers
32	Applications of vaccines in animal infections	AT1- Ch 10; Pg. 323-329	LCD
33	Gene therapy for animal diseases	AT1- Ch 28; Pg. 452-460 AT3- Ch 13; Pg. 157-172	LCD
34	Gene therapy for animal diseases	T2 – Ch 2; Pg. 23-92	LCD
Content beyond syllabus covered (if any): History of vaccines, basic principles of immunology, Immunological methods for diagnosis of animal diseases			

* Session duration: 50 mins

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Unit : IV

Unit Syllabus : **MICROMANIPULATION OF EMBRYO'S** **6**

What is micromanipulation technology; equipments used in micromanipulation; enrichment of x and y bearing sperms from semen samples of animals; artificial insemination and germ cell manipulations; in vitro fertilization and embryo transfer; micromanipulation technology and breeding of farm animals.

Objective: This course provides the knowledge about the concepts of micromanipulation technology and transgenic animal technology.

Session No *	Topics to be covered	Ref	Teaching Aids
35	Micromanipulation technology; Genetic manipulation of animals, Manipulation of reproduction in animals for improving the qualities of animal Video 3, Video 4	AT1 – Ch 14; Pg. 386-387, AT1 – Ch 14; Pg. 402-407	LCD, Animated Videos
36	Methods of manipulation technology, Intrauterine insemination, Invitro fertilization, Gamete intrafallopian transfer, Cytoplasmic transfer, Micromanipulation, Cryopreservation and assisted hatching	AT1- Ch 14; Pg. 402-407	LCD
37	Enrichment of x and y bearing sperms from semen samples of animals Sperm Sorting, Ericsson Method, Flow Cytometry (OR) Microsorting	AT3 - Ch 18; Pg. 228	LCD
38	Artificial insemination and germ cell manipulations, 1. Semen collection, 2. Semen evaluation, 3. Semen Processing, 4. Storage, Thawing, and Handling	AT1 - Ch 14; Pg. 387-391 AT1 – Ch 1; Pg. 27-28	LCD
39	Induction of super ovulation, Monitoring of ovarian response, Oocyte retrieval, Fertilization in vitro Embryo transfer, In *vitro* fertilization & Embryo transfer Video 5	AT1 -Ch 14; Pg. 392-401	LCD, Animated Videos
40	Breeding of farm animals for better quality, Different techniques followed in IVF lab for the breeding of farm animals.	AT1 –Ch 14; Pg. 405, 386-387	LCD

Content beyond syllabus covered (if any):

Equipments used in micromanipulation technology. CO_2 Incubator, inverted microscope, SoS oil syringe, SAS SYRINGE, Screw Actuated Syringe, Micrometer-Actuated Syringe, Glue technology for IVF, modern methodology for monitoring egg quality, analysis of chromosomal disorders, method for grading of oocytes

Course outcome

The students are taught the indepth knowledge in artificial insemination and *in vitro* fertilization methodology for better breeding of animal for quality products

* Session duration: 50 mins

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Unit :V

Unit Syllabus : **TRANSGENIC ANIMALS** **5**

Concepts of transgenic animal technology; strategies for the production of transgenic animals and their importance in biotechnology; stem cell cultures in the production of transgenic animals.

Objective: This course provides the knowledge about the application of clinical research.

Session No *	Topics to be covered	Ref	Teaching Aids
41	A genetically modified organism (GMO) or genetically engineered organism (GEO), Concepts of transgenic animal technology & Strategies for the production of transgenic animals Video 6, Video 7, Video 8	AT1- Ch 15; Pg. 409-431 AT3 - Ch 41; Pg. 480-484	LCD, Animated Videos
42	What is transgenesis, procedure for transgenesis, DNA microinjection, Embryonic stem cell-mediated gene transfer, Retrovirus-mediated gene transfer Video 9	AT1 - Ch 15; Pg. 412-422 AT3 - Ch 41; Pg. 480-484	LCD, Animated Videos
43	transgenic animals in biotechnology - mice, birds, fish, pigs, Importance of transgenic animals in biotechnology	AT1 – Ch 15; Pg. 412-422 AT3- Ch 41; Pg. 480-490	LCD
44	Importance of stem cell cultures, what are stem cells, types of stem cells, sources of stem cells, properties	AT1 – Ch 15; Pg. 409-431, AT3 - Ch 41; Pg. 447-449	LCD
45	Stem cell cultures in the production of transgenic animals. - mice, stem cell therapy for tissue replacement, clinical use- heart disease, Brain and Spinal Cord Injury, diabetics, Skin and Hair Replacement.	AT1 – Ch 15; Pg. 409-431	LCD
Content beyond syllabus covered (if any): stem cell therapy for tissue replacement, clinical use- heart disease, Brain and Spinal Cord Injury, diabetics, Skin and Hair Replacement.			

* Session duration: 50 mins

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TEXT BOOKS

1. R.Ian Freshney Culture of Animal cells, A Manual of Basic technique and specialized applications, 6th Edition, John Wiley & Sons, 2010.
2. Portner R, Animal cell biotechnology: methods and protocols, 2nd Edition, Humana Press, 2007

REFERENCE

1. Masters J.R.W. Animal Cell Culture: Practical Approach. Oxford University Press, 2000

ADDITIONAL TEXT BOOKS

1. Ranga M.M. Animal Biotechnology. Agrobios India Limited, 2002
2. Ramadass P, Meera Rani S. Text Book of Animal Biotechnology. Akshara Printers, 1997.
3. U.Sathyanarayana, Biotechnology, Books and Allied Ltd, 5th Ed, 2020.

ANIMATED VIDEOS

1. Immunohistochemistry (https://youtu.be/Ua5KYyWUzhY)
2. Immunohistochemistry (https://youtu.be/loGbomI65wo)
3. Micromanipulator (https://youtu.be/adCjRYpDSxM)
4. DNA microinjection| Embryonic stem cell mediated gene transfer (https://youtu.be/KZOW-BsIcdU)
5. Embryonic Stem Culture (https://youtu.be/QAlKhBOl7Xk)
6. GMO (https://youtu.be/bmi45JLJOgU)
7. Transgenic animals (https://youtu.be/RzYhcXjksKc)
8. Transgenic animals (https://youtu.be/Z-l_e5_WEWM)
9. Embryonic stem cells and Somatic cell nuclear transfer (https://youtu.be/1XNy9vqFcCg)

BLENDED LEARNING VIDEO

1. Diseases in animals (https://www.youtube.com/playlist?list=PLODKZZeKAWb-PMMqRrD4hNUG4v7bkVbt1/BT18012-diseases)

	Prepared by	Approved by
Signature	P.K.Praveen 3.1.24	3/1/24
Name	**Dr. P.K.Praveen Kumar**	**Dr. E.Nakkeeran**
Designation	**Professor**	**Professor & Head**
Date	**03/01/2024**	**03/01/2024**
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD