SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Biotechnology	LP:BT18029 Rev. No: 00 Date: 10-07-2023
~~B.E~~/B.Tech/~~M.E/M.Tech~~ : Biotechnology Regulation:2018 PG Specialisation : Not Applicable Sub. Code / Sub. Name : BT18029 / Molecular Therapeutics Unit : I	

Unit Syllabus: 1 GENE THERAPY 9 Hrs

Gene therapy - Intracellular barriers to gene delivery, Overview of inherited and acquired diseases for gene therapy, Retro and Adeno virus mediated gene transfer, Liposome and nanoparticles mediated gene delivery.

Objective: To know about the gene therapeutic techniques

Session No *	Topics to be covered	Ref	Teaching Aids
1	Introduction to gene therapy – Exvivo, Invivo	RB 5 Pg.419-420	PPT/BB
2	Gene delivery methods – Viral, Physical and Non viral	RB 2 Pg.420-423	PPT/BB
3	Gene therapy for inherited and acquired diseases- Cystic fibrosis, Cancer	TB 2 Pg.149-163	PPT/BB
4	Gene transfer using retro viruses – Life cycle and Types	RB 4 Pg.33-60	PPT/BB
5	Gene transfer using adeno viruses – Adeno associated virus	RB 4 Pg.61-92	PPT/BB
6	Non viral gene delivery methods – Microinjection, Particle bombardment	RB 4 Pg.61-92	PPT/BB
7	Liposomes and gene delivery – preparation and dispersion	RB 2 Pg.93-100	PPT/BB
8	Nanoparticles and gene delivery – Conjugation	RB 2 Pg.100-112	PPT/BB
9	Gene therapy for monogenic disease and multifactorial disease	RB 1 Pg.191-335	PPT/BB

Content beyond syllabus covered (if any): Dendrimers

* Session duration: 50 minutes

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Sub. Code / Sub. Name: **BT18029 / Molecular Therapeutics**

Unit : II

Unit Syllabus :2 CELLULAR THERAPY 9 Hrs

Cellular therapy- Stem cells definition, properties and potency of stem cell, Sources - embryonic and adult stem cells, Concept of tissue engineering - Role of scaffolds, Role of growth factors, Role of adult and embryonic stem cells, Clinical applications, Ethical issues.

Objective: To understand the importance of cellular therapy

Session No*	Topics to be covered	Ref	Teaching Aids
10	Introduction to stem cells and cellular therapy	RB 5 Pg.453-457	PPT/BB
11	Stem cells, properties and potency – Totipotent, pluripotent and multipotent	RB 2 Pg.457-459	PPT/BB
12	Various types of stem cells and their identification – flow cytometry	TB 2 Pg.137-145	PPT/BB
13	Basic concepts in tissue engineering	TB 2 Pg.137-146	PPT/BB
14	Biomaterials types	TB 2 Pg.137-146	Smart Board/BB
15	Scaffolds and tissue engineering	TB 2 Pg.137-146	PPT/BB
16	Growth factors in tissue engineering	TB 2 Pg.137-146	PPT/BB
17	Clinical applications of stem cell therapy	TB 2 Pg.145-147	Smart Board/BB
18	Ethical issues in stem cell therapy	TB 2 Pg.137-146	PPT/BB

Content beyond syllabus covered (if any): CAR-T Cell Therapy

* Session duration: 50 mins

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Sub. Code / Sub. Name: **BT18029 / Molecular Therapeutics**

Unit : III

Unit Syllabus: 3 RECOMBINANT THERAPY 9 Hrs

Recombinant therapy - Clinical applications of recombinant technology, Erythropoietin, Insulin analogs and its role in diabetes, Recombinant human growth hormone, Streptokinase and urokinase in thrombosis, Recombinant coagulation factors.

Objective: To understand recombinant DNA technology and its applications

Session No *	Topics to be covered	Ref	Teaching Aids
19	Recombinant protein production technology	RB 5 Pg.37-56	PPT/BB
20	Recombinant erythropoietin and its applications	RB 5 Pg.272-278	PPT/BB
21	Diabetes	RB 5 Pg.291-292	PPT/BB
22	Recombinant insulin and analogs	RB 5 Pg.292-304	Smart Board/BB
23	Recombinant growth hormone and its applications	RB 5 Pg.307-309	PPT/BB
24	Recombinant streptokinase in thrombosis	RB 5 Pg.350	PPT/BB
25	Recombinant urokinase in thrombosis	RB 5 Pg.350	PPT/BB
26	Recombinant coagulation factors	RB 5 Pg.329-339	PPT/BB
27	Testing of recombinant products before human use	RB 5 Pg.74-104, 173-202	PPT/BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes

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Sub. Code / Sub. Name: **BT18029 / Molecular Therapeutics**

Unit : IV

Unit Syllabus: 4 IMMUNOTHERAPY 9 Hrs

Immunotherapy - Monoclonal antibodies and their role in cancer, Role of recombinant interferons, Immuno-stimulants, Immuno-supressors in organ transplants, Role of cytokine therapy in cancers, Vaccines - types, recombinant vaccines and clinical applications.

Objective: To understand immunotherapeutic techniques

Session No *	Topics to be covered	Ref	Teaching Aids
28	Introduction to immunotherapy	RB 5 Pg.371-373	PPT/BB
29	Monoclonal antibody production – selection and screening	RB 5 Pg.373-378	PPT/BB
30	Monoclonal antibodies in cancer treatment - rituximab	RB 5 Pg.379-395	PPT/BB
31	Immunotherapy with recombinant interferons	RB 5 Pg.205-237	PPT/BB
32	Recombinant cytokines and cancer therapy	RB 5 Pg.241-262	PPT/BB
33	Principles and tests for organ transplant	RB 5 Pg.99-112	PPT/BB
34	Immunostimulants and immunosuppressants in organ transplant	RB 1 Pg.491-494	PPT/BB
35	Recombinant technology in vaccine production – vectors and hosts	RB 5 Pg.396-400	PPT/BB
36	Recombinant vaccines and clinical applications – subunit vaccines, ScFv	RB 5 Pg.400-416	PPT/BB

Content beyond syllabus covered (if any):

* Session duration: 50 mins

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COURSE DELIVERY PLAN - THEORY

Sub. Code / Sub. Name: **BT18029 / Molecular Therapeutics**

Unit : V

Unit Syllabus: 5 9 Hrs

Gene silencing technology - Antisense therapy, si RNA, Tissue and organ transplantation, Transgenics and their uses, Cloning, Ethical issues.

Objective: To learn gene silencing techniques and its applications

Session No *	Topics to be covered	Ref	Teaching Aids
37	Introduction to gene silencing	TB2 Pg. 181-183	PPT/BB
38	Antisense therapy and gene silencing	TB2 Pg. 183-185	PPT/BB
39	Si RNA and its importance in gene silencing	TB2 Pg. 185-187	PPT/BB
40	Organ transplantation	RB1 Pg. 481-490	PPT/BB
41	Gene silencing in tissues	TB2 Pg. 189-204	PPT/BB
42	Basics of Trangenics technology	TB2 Pg. 83-93	PPT/BB
43	Trangenics animals	TB2 Pg. 93-97	PPT/BB
44	Transgenics and gene silencing	TB2 181-183 RB5 445-449	PPT/BB
45	Ethical issues in gene silencing technology	TB2 Pg. 231-245	PPT/BB

Content beyond syllabus covered (if any): Quelling

Sub Code / Sub Name: **BT18503/ Molecular Biology**

TEXT BOOKS:

1. Friefelder, David, "Molecular Biology" 2nd Edition, Narosa Publications, 1999.
2. Weaver, Robert F, "Molecular Biology" 5nd Edition, Tata McGraw-Hill, 2008.
3. Karp, Gerald, "Cell & Molecular Biology": Concepts & Experiments" 4th Edition, John Wiley, 2005.
4. Friefelder, David & George M. Malacinski, "Essentials of Molecular Biology" 2nd Edition, Panima Publishing, 1993.
5. Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick, Lewin's GENES XI, Published by Jones & Bartlett Learning; 11th edition, 2013.

REFERENCE BOOKS:

1. Tropp, Burton E, "Molecular Biology: Genes to Proteins". 3rd Edition. Jones and Bartlett, 2008.
2. Glick , B.R. and J.J. Pasternak, "Molecular Biotechnology: Principles and Applications of Recombinant DNA" 4th Edition. ASM, 2010.

	Prepared by	Approved by
Signature		
Name	J. Hariharan	Dr.E.Nakkeeran
Designation	Assistant Professor	HOD
Date	10.07.2023	10.07.2023

Remarks *:
The Same lesson plan will be followed in the subsequent year

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