

Course Title	Course Structure			Pre-Requisite
	L	T	P	
<b>Stem Cells and Regenerative Medicines (BT308)</b>	3	1	0	NIL

#### Course Objective:

Introduction to stem cell technology and application

#### Course Outcome (CO):

1. Gain comprehensive knowledge of various stem cell types and their roles in development and repair.
2. Explain the use of stem cells in tissue engineering, organ transplantation, and disease treatment.
3. Develop hands-on skills in stem cell culture, differentiation, and genetic manipulation techniques.
4. Understand the ethical, legal, and social implications and regulations of stem cell research and therapy.
5. Analyze current research literature and propose new directions in stem cell and regenerative medicine research.

S. No.	Content	Contact Hours
1.	<b>Basic elements of stem cells and tissue engineering</b> Definition of stem cells, historical perspectives and various types of stem cells in use. Stem Cells – Basics, Properties and Classification, Stem Cells in Gastrointestinal, Liver, Pancreas, Kidney, Heart, Spinal Cord and Lung Regeneration Stem Cells in Eye Diseases and Disorders	8
2.	<b>Regenerative Medicine: from Bench to Bedside</b> The repair and regeneration of tissues for therapeutic purposes, such as replacing bone marrow in leukemia, cartilage in osteoarthritis or cells of the heart after a heart attack.	8
3.	<b>Molecularly Targeted Therapies in Blood Disorders and Malignancy</b> The discoveries of several novel regenerative treatments; Gene therapy, the potential of drugs based on RNA interference and the reprogramming of somatic cells into stem cells for regenerative medicine.	8

4.	<b>Developmental and molecular biology of regeneration</b> , pluripotent stem cells and genome engineering for modeling human diseases	9
5.	<b>Stem Cells: A Cure or Disease?</b>  Recent developments in stem cell science, underlying biology behind the idea of using stem cells to treat disease, specifically analyzing the mechanisms that enable a single genome to encode multiple cell states ranging from neurons to fibroblasts to T cells.	9
TOTAL		42

**Books: -**

S. No.	Name of Books/ Author/Publisher
11.	Stem Cells and Regenerative Medicine, Walter C Low, Catherine M Verfaillie ISBN: 978-981-4, 2008
12.	Stem Cell Repair and Regeneration; Nagy Habib, Nataša Y Levičar, Myrtle Gordon, Long Jiao, Nicholas Fisk Volume 2, 2008
13.	Developmental Biology, 6th Edition, Scott F. Gilbert, 2000
14.	Hematology, William J. Williams, Ernest Beutler, Allan JU. Erslev, Marshall A. Lichtman, 2007
15.	Stem Cell Biology by Marshak, Cold Spring Harbar Symposium Publication, 2001

**Metabolic Engineering**

**Details of course: -**

Course Title	Course Structure			Pre-Requisite
	L	T	P	
<b>Metabolic Engineering (BT310)</b>	3	1	0	NIL

**Course Objective:**

To impart basic knowledge of metabolic engineering, metabolic flux and applications of metabolic engineering

**Course Outcome (CO):**