STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **BIOTECHNOLOGY**

Name/s of the Faculty : **DR. ARUNA SHARMILI S**

Course Title : **STEM CELL AND TISSUE ENGINEERING**

Course Code : **23BY/PC/ST44**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	describe the basics of stem cells and tissue engineering	K1, K2
CO2	relate the relationship between stem cells and tissue engineering in biology	K3
CO3	outline the use of stem cells and tissue engineering to address medical requirements	K4
CO4	evaluate the application of stem cells and tissue engineering	K5
CO5	integrate stem cells and tissue engineering concepts in regenerative medicine	K6
	CL – Cognitive Level K1 – Remember | K2 – Understand | K3 – Apply | K4 – Analyse | K5 – Evaluate | K6 – Create	

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods

Feb 3-8, 2025 (Day Order 1 to 6)	1	**Introduction to Stem Cells** 1.1 Stem Cells – History, Classification and Types 1.2 Isolation, Characterization, Scale-Up of Stem Cells 1.3 Stem Cell Banking	 K1-K3 K3-K5	 3 6 1	 1-2 2-4	Lecture and PowerPoint	MCQ
Feb 10– 18, 2025 (Day Order 1 to 6)	1 2	**Introduction to Stem Cells** 1.3 Stem Cell Banking 1.4 Stem Cell-Based Products in the Market **Basic Biology/ Mechanisms** 2.1 Stem Cell Marker 2.2 Stem Cell Niches	 K3-K5 K2-K6 K1-K4	 3 2 3 2	 2-4 1-5 1-3	Lecture and PowerPoint	Group Discussion **III Component Assignment**
Feb 19- 21, 2025 (Day Order 1-3)	2	**Basic Biology/Mechanisms** 2.3 Stem Cell Regulators 2.4 Stem Cell Signaling Pathways: JAK/STAT, Wnt, MAPK, TGFβ	 K3-K6	 3 3	 2-5	Lecture and PowerPoint	Quiz
Feb 24-26, 2025	**CA I**						
	2	**Basic Biology/Mechanisms** 2.4 Stem Cell Signaling Pathways: JAK/STAT, Wnt, MAPK, TGFβ	 K3-K6	 2	 2-5	Lecture and PowerPoint	Group Discussion
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	2 3	**Basic Biology/Mechanisms** 2.4 Stem Cell Signaling Pathways: JAK/STAT, Wnt, MAPK, TGFβ **Applications of Stem Cells** 3.1 Parkinson's Disease 3.2 Multiple Sclerosis 3.3 Diabetes 3.4 Burns	 K3-K6 K1-K6	 3 2 2 2 1	 2-5 1-5	Lecture and PowerPoint	Group Discussion

Mar 7 – 12, 2025 (Day Order 1 to 4)	3 4	**Applications of Stem Cells** 3.4 Burns **Tissue Engineering** 4.1 History and Scope of Tissue Engineering 4.2 Biomaterials in Tissue Engineering	K1-K6 K1-K2 K1-K4	1 2 5	1-5 1 1-3	Lecture and PowerPoint	Group Discussion **III Component Assignment**
Mar 13 –15, 2025	**C.A. Test - II**						
	4	**Tissue Engineering** 4.3 Models for Tissue Engineering, 3D Bioprinting	K2-K5	2	1-4	Lecture and PowerPoint	Group Discussion
Mar 17 – 20, 2025 (Day 3 to 6)	4	**Tissue Engineering** 4.3 Models for Tissue Engineering, 3D Bioprinting 4.4 Bioreactors	K2-K5 K2-K6	4 3	1-4 1-6	Lecture and PowerPoint	Group Discussion Quiz
Mar 21 - 28, 2025 (Day Order 1 to 6)	4 5	4.4 Bioreactors **Applications of Tissue Engineering** 5.1 Bioartificial Pancreas, Cell Transfusion (Islets) 5.2 Red Blood Cell Substitutes 5.3 Artificial Womb 5.4 Breast Reconstruction	K2-K6 K1-K3 K2-K4 K2-K6	2 2 2 2 2	1-6 1-2 1-3 1-5	Lecture and PowerPoint	Group Discussion
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **BIOTECHNOLOGY**

Name/s of the Faculty : **DR. J. ANBUMALARMATHI**

Course Title : **Bio-Nanotechnology**

Course Code : **23BY/PC/BN44**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	describe concepts of bionanotechnology	K1, K2
CO2	relate the structural and functional principles of nanobiotechnology	K3
CO3	analyse and characterise the nanomaterials	K4
CO4	evaluate the applications of nanomaterials in various field	K5
CO5	design new methods for the synthesis of nanomaterials and formulate their applications	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods

Feb 3-8, 2025 (Day Order 1 to 6)	1	1.1 Concept and Definitions of Nano-biotechnology & Historical Background 1.2 Fundamental Sciences and Broad Areas of Nano-biotechnology 1.3 Raw Materials of Nanotechnology 1.4 Properties of Nanoparticles	K1-K3 K1-K3 K1-K3 K1-K6	3 3 3 1	1-2 1-2 1-2 1-5	Lecture and PowerPoint presentation	Quiz
Feb 10– 18, 2025 (Day Order 1 to 4)	1 2	1.4 Quantum Confinement, Surface Plasmon Resonance 2.1 Classification Based on Dimensionality 2.2 Metal Based Nanomaterials - Nanogold, Nano Silver and Metal Oxides	K1-K6 K1-K3 K4-K6	3 2 2	1-5 1-2 3-5	Lecture and PowerPoint presentation	Experiment
Feb 19- 21, 2025 (Day Order 1 to 3)	2	2.2 Metal Based Nanomaterials - Metal Oxides 2.3 Carbon Based Nano Materials – Bucky Balls, Nanotubes 2.4 Nanocomposites, Nanopolymers, Nano ceramics, Biological Nanomaterials	K4-K6	1 2 2	3-5	Lecture and PowerPoint presentation	Group discussion
Feb 24-26, 2025	**C.A. Test – I**						
	3	3.1 Nanoparticle Synthesis – Solvent Evaporation	K1-K4	2	1-3	Lecture and PowerPoint presentation	Quiz
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	3	3.1 Spontaneous Emulsification, Polymerization, Salting Out, Sol Gel, Reverse Micelle Method 3.2 Molecular Self Assembly, Biosynthesis – Bacteria, Plant	K1-K4 K1-K6 K3-K6	3 3 4	1-3 1-5	Lecture and PowerPoint presentation	Third component- Case analysis

		3.3 Characterization of Nanoparticles – UV Spectroscopy, STM, AFM, XRD			2-5		
Mar 7 – 12, 2025 (Day Order 1 to 4)	3 4	3.4 Green Synthesis of Nanoparticles – Demonstration 4.1 Food Applications	K3-K6 K2-K6	3 4	2-5 1-5	Lecture and PowerPoint presentation	Experiment
Mar 13–15, 2025	**C.A. Test – II**						
	4	4.1 Cosmetics Applications 4.2 Textiles and Paints	K2-K6	1 1	1-5	Lecture and PowerPoint presentation	Group discussion
Mar 17 - 20, 2025 (Day Order 3 to 6)	4	4.2 Textiles and Paints 4.3 Bioremediation 4.4 Biosensors	K2-K6	2 2 2	1-5	Lecture and PowerPoint presentation	Third component-Assignment
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.1 Nanomaterials in Bone Substitutes 5.1 Nanomaterials in Dentistry 5.3 Nanoparticles for Cancer Therapy 5.4 Nanopharmaceuticals – Nanosuspensions, Nano-encapsulation, Nanogels for Drug Therapy	K2-K6	2 2 3 3	1-5	Lecture and PowerPoint presentation	MCQ
Mar 29- Aril 2, 2025 (Day Order 1 to 3)	**REVISION**						

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2024 – April 2025

Department : **BIOTECHNOLOGY**
Name/s of the Faculty : **DR. S. JAYASHREE**
Course Title : **IPR, BIOSAFETY, BIOETHICS AND ENTREPRENEURSHIP**
Course Code : **23BY/PE/IB15**
Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	recall and discuss the basics of IPR, biosafety, bioethics and entrepreneurship	K1, K2
CO2	compile the procedures and practice of IPR, biosafety, bioethics and entrepreneurship	K3
CO3	outline the importance of IPR, biosafety, bioethics and entrepreneurship	K4
CO4	identify the policies and opportunities of IPR, biosafety, bioethics and entrepreneurship	K5
CO5	develop systematic plans for innovation, IPR, biosafety, bioethics and entrepreneurship in the biotechnology industries	K6
	CL – Cognitive Level K1 – Remember | K2 – Understand | K3 – Apply | K4 – Analyse | K5 – Evaluate | K6 – Create	

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 3-8, 2025 (Day Order 1 to 6)	1	**Intellectual Property Rights** 1.1 Introduction to IPRs - Patents, Trademarks, Copyrights, Industrial Design, Geographical Indications, Traditional Knowledge 1.2 IPRs – Implications for India - WTO, WIPO, GATT, TRIPS, Types of Patent Applications **1.3** Patent Search	K1-K5 K1-K5 K3-K6	5 3 2	1-4 1-4 2-5	Lecture and Power point	MCQ
Feb 10– 18, 2025 (Day Order 1 to 6)	2	**Biosafety** 2.1 Good Lab Practices, Good Manufacturing Practices, Biological Safety Cabinets - Types 2.2 Biosafety Levels for Infectious Agents, Guidelines for rDNA research activities	K1-K5 K2-k5	5 5	1-4 1-4	Lecture and PowerPoint	Group Discussion III Component Assignment
Feb 19- 21, 2025 (Day Order 1-3)	2	2.2 Biosafety Levels for Infectious Agents, Guidelines for rDNA research activities 2.3 Cartagena Protocol	K2-K5 K4-K6	2 4	1-4 3-5	Lecture and PowerPoint	Quiz
Feb 24-26, 2025	**CA I**						

	3	**Bioethics** 3.1 Principles of Research Ethics	K1-K3	2	1-2	Lecture and PowerPoint	Group Discussion
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	3 4	3.2 Ethical Issues in Clinical Trials 3.3 Ethical Implications - Cloning, Gene Therapy **Entrepreneurship** 4.1 Types of Entrepreneurs	K2-K3 K3-K6 K1-K4	4 4 2	1-2 2-5 1-3	Lecture and PowerPoint	Group Discussion
Mar 7 – 12, 2025 (Day Order 1 to 4)	4	**Entrepreneurship** 4.1 Types of Entrepreneurs 4.2 Project Identification, Methods of Project Appraisals	K1-K4 K1-K5	4 4	1-3 1-3	Case study	Group Discussion III Component Assignment
Mar 13 –15, 2025	**C.A. Test - II**						
	4	4.2 Project Identification, Methods of Project Appraisals 4.3 Project Report - Content and Significance	K1-K5 K2-K6	1 1	1-3 1-5	Lecture and PowerPoint	Group Discussion
Mar 17 – 20, 2025 (Day 3 to 6)	4 5	4.3 Project Report - Content and Significance, Project Report - Planning Commission's Guidelines for Formulating Project Reports **Entrepreneurship Strategies**	K2-K6 K1-K3	3 3	1-5 1-2	Lecture and PowerPoint	Seminar

		5.1 Structure of a Biotechnology Company					
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.2 New Product Development, Market Research 5.2 Funding of Biotech Business 5.3 Biotechnology Incubator, Biotechnology Industries in India	K2-K5 K3-K6 K3-K6	2 3 5	1-4 2-5 2-5	Pitch a product Lecture and PowerPoint	Group Discussion
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **BIOTECHNOLOGY**

Name/s of the Faculty : **Dr. K. VEENA GAYATHRI**

Course Title : **PHARMACEUTICAL BIOTECHNOLOGY**

Course Code : **23BY/PE/PB15**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Define the drugs and outline their requisites	K1, K2
CO2	Implement the developmental methods for drug manufacturing and administration	K3

CO3	Categorize various production processes, formulation and improve the distribution of drugs						K4
CO4	Evaluate various biotechnology approaches to produce therapeutics and its applications						K5
CO5	Integrate research, clinical trials of pharmaceutical commerce and toxicology						K6
	CL – Cognitive Level K1 – Remember | K2 – Understand | K3 – Apply | K4 – Analyse | K5 – Evaluate | K6 – Create						
Week	**Unit No.**	**Content**	**Cognitive Level**	**Teaching Hours**	**COs**	**Teaching Learning Methodology**	**Assessment Methods**
Feb 3-8, 2025 (Day Order 1 to 6)	1	General Basics of Pharmacology 1.1 Introduction of Pharmacology; Drugs, Chemotherapeutic Agents-its Applications 1.2 Sources of Drugs, Routes of Administration, Drug Interactions 1.3 Pharmacokinetics-ADMET and Pharmacodynamics Drug Discovery and Delivery 2.1 Drug Discovery- Process, Research and Development Perspectives	 K1,K2, K5 K1-K3 K1-K3, K6	 3 3 3 1	 1,4 1-2 1-2,5	Lecture and PowerPoint	MCQ
Feb 10– 18, 2025 (Day Order 1 to 6)	2	Drug Discovery and Delivery 2.1 Drug Discovery- Process, Research and Development Perspectives 2.2 Dosage forms - Advantages and Disadvantages	K1-K6 K1-K3	2 3 5	1-5 1-2	Lecture and PowerPoint	Quiz

		2.3 Drug Delivery - Role of Biopolymers-Applications	K1, K3-K5				
Feb 19- 21, 2025 (Day Order 1-3)	3	Formulation 3.1 Capsules – Importance of Base Absorption; Micro-encapsulation and its Types 3.2 Tablets Manufacturing and its Types, Coating on Tablets	K1-K4	5 1	1-2,4 1-3	Lecture and PowerPoint	Quiz
Feb 24-26, 2025	**CA I**						
	3	3.2 Tablets Manufacturing and its Types, Coating on Tablets	K1-K4	2	1-3	Lecture and PowerPoint	Group Discussion
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	3 4	3.3 Types of Parenteral Products-Oral Liquids, Injections, Transdermal Therapeutics 4.1 Introduction and Preparation of Bacterial Vaccines, Toxoids, Viral Vaccines and Antitoxins	K1-K4 K1-K5	5 5	1-3	Lecture and PowerPoint	**III Component Assignment** Group Discussion
Mar 7 – 12, 2025 (Day Order 1 to 4)	4	4.2 Applications of r DNA Technology in the Production of Drugs	K1-K5	5	1-4	Lecture and PowerPoint	Group Discussion
	C.A. Test – II						

Mar 13 –15, 2025	4	4.3 Biotechnology Derived Therapeutic Product (i) Interferon (ii) Vaccines	K1-K5	2	1-4	Lecture and PowerPoint	III Component Group Discussion
Mar 17 – 20, 2025 (Day 3 to 6)	4 5	4.3 Biotechnology Derived Therapeutic Product Hepatitis- B (iii) Hormones Clinical Research and Toxicology 5.1 Clinical Research and its Phases	K1-K5 K5-K6	3 5	1-4	Lecture and PowerPoint	Group Discussion Quiz
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.2 Clinical Trials – New Drug Approval Process-Global and Indian Perspectives 5.3 Toxicology - General Principles and its Type	K4-K6 K3-K6	5 5	3-5 2-5	Lecture and PowerPoint	Group Discussion
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						