GUJARAT TECHNOLOGICAL UNIVERSITY

NANO TECHNOLOGY (39)
NANOTECHNOLOGY FOR ADVANCED DRUG DELIVERY SYSTEMS
SUBJECT CODE: 2183902
B.E.8th SEMESTER

Type of course: Material Science, Chemistry, Biotechnology and Nanotechnology, Nanotechnology and Nanomedicine

Prerequisite: Fundamental of Chemistry, Synthesis of Nano materials, Physics of Nano materials

Rationale: The purpose of this course is to provide a review of timely concepts in the rapidly emerging field of nano medicine. It reviews how nanomedicine is redefining clinical research in areas such as diagnostic imaging agents and drug delivery.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	0	4	70	20	10	0	0	0	100

Content:

Sr. No.	Content	Total Hrs.	% Weig
1	Nano medicine and Advanced Drug Delivery 1. Introduction 2. Nanomedicine 3. Drug delivery 4. Types of systems used 5. Applications 6. Cancer 7. Visualization 8. Sensing 9. Blood purification 10. Tissue engineering 11. Medical devices	**13**	**20%**
2	**Type of Drug delivery and other parameters for drug delivery** 1. Oral 2. Ophthalmic 3. Otologic / Nasal 4. Urogenital 5. Rectal (enteral) 6. Dermal Injection/Infusion 7. Dosage forms	**13**	**20%**
3	**Delivery of Nanoparticles to the Cardiovascular System** 1. Introduction	**13**	**20%**

	2. Targeting the Myocardium with Immunoliposomes 3. Other Nanoparticle-Targeting of the Cardiovascular System 4. Novel Application of Nano-Immunoliposomes 5. CSIL as Targeted Gene or Drug Delivery 6. Conclusion		
4	**Aerosols as Drug Carriers** 1. Introduction 2. Pulmonary Drug Delivery Devices 3. Aerosol Particle Size 4. Targeting Drug Delivery in the Lung 5. Clearance of Particles from the Lung	**13**	**20%**
5	**Carrier Design** 1. Biocompatibility 2. Material selection (by application) 3. Imaging 4. Gene delivery 5. Delivery of therapeutic enzymes 6. Small molecule drugs 7. Types of nanocarriers 8. Mechanisms of drug loading 9. Drug release mechanisms 10. Nanocarriers for active targeting 11. Conclusion: Safety Issues, Limitations and Perspectives	**13**	**20%**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
24	**21**	**18**	**7**	**-**	**-**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

1. Nanoperticulates as Drug Carriers EDITOR VLADIMIR P TORCHILIN Northeastern University, USA Imperial College Press
2. The Handbook of Nanomedicine, Kewal K. Jain MD, FRACS, FFPM Jain Pharma Biotech, Basel, Switzerland Humana Press, a part of Springer Science +Business Media, LLC

Course Outcome:

1. To comprehend the principles behind nanomedicine, Drug Carries, Drug Delivery
2. To gain a broad understanding of concepts and applications of nanomedicine and Drug Delivery.
3. Understanding of concepts of nanomedicine to a focused clinical area of their choice.
4. To impart the knowledge to apply these nano drug delivery systems for the diagnosis and therapy.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.