

GUJARAT TECHNOLOGICAL UNIVERSITY

NANO TECHNOLOGY (39) NANOTECHNOLOGY AND MEDICINE SUBJECT CODE: 2163903 B.E. 6th SEMESTER

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

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 nanomedicine. 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 C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M)		ESE (V)		PA (I)		
				PA	ALA	ESE	OEP			
3	0	0	3	70	20	10	0	0	0	100

Content:

Sr. No.	Content	Total Hrs.	% Weig
1	Nano medicine Introduction Basics of Nanobiotechnology in Relation to Nanomedicine Relation of Nanobiotechnology to Nanomedicine Landmarks in the Evolution of Nanomedicine	10	20%
2	Nanocapsules: Preparation, Characterization and Therapeutic Applications Introduction Preparation Nanocapsules obtained by interfacial polymerization Oil-containing nano capsules Nanocapsules containing an aqueous core Nanocapsules obtained from preformed polymers Characterization Drug Release Applications Oral route Parenteral route Ocular delivery	10	20%
3	Magnetic Nanoparticles as Drug Carriers Introduction Definitions Properties of magnetic materials Nanoparticles Magnetic Nano particles	10	20%

	Ironoxide based magnetic nanoparticles Cobalt based magnetic nanoparticles Ironbased magnetic particles Encapsulated magnetic nanoparticles Biocompatibility issues of magnetic nanoparticles		
4	Application of Magnetic Nanoparticles as Drug Carriers Magnetic hyperthermia Magnetic chemotherapy Other magnetic treatment approaches Magnetic gene transfer	10	20%
5	Nanoparticle-Based Drug Delivery Gold Nanoparticles as Drug Carriers Calcium Phosphate Nanoparticles Cyclodextrin Nanoparticles for Drug Delivery Dendrimers for Drug Delivery Fullerene Conjugate for Intracellular Delivery of Peptides Polymer Nanoparticles Ceramic Nanoparticles Nanoparticles Bound Together in Spherical Shapes Encapsulating Water-Insoluble Drugs in Nanoparticles Self-Assembling Nanoparticles for Intracellular Drug Delivery Particle Replication in Nonwetting Templates Flash Nano Precipitation Nanoparticle Combinations for Drug Delivery	10	20%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
23	22	18	7	00	00

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

Reference Books:

1. The Handbook of Nanomedicine Kewal K. Jain MD ISBN: 978-1-60327-318-3 e-ISBN: 978-1-60327-319-0 Library of Congress Control Number: 2007940762 ,2008 Humana Press, a part of Springer Science+Business Media, LLC.
2. Nano Particulates As Drugcarriers , Vladimirptorchilin ,NortheasternUniversity,USA ,ImperialCollegePress (WorldScientificPublishingCo.Pte.Ltd.)
3. Nanoparticle Technology for Drug Delivery edited by Ram B. Gupta Auburn University,Auburn, Alabama Uday B. Kompella University of Nebraska Medical Center Omaha, Nebraska New York London, Published in 2006 byTaylor & Francis Group

Course Outcome:

1. To comprehend the principles behind nanomedicine
2. To gain a broad understanding of concepts and applications of nanomedicine
3. Understading 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.

List of Open Source Software/learning website:

<https://en.wikipedia.org/wiki/Nanomedicine>

<http://www.nanotechproject.org/inventories/medicine/>

<http://www.nanomedjournal.com/>

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.