

GUJARAT TECHNOLOGICAL UNIVERSITY

NANO TECHNOLOGY (39) NANOTECHNOLOGY IN HEALTH CARE SUBJECT CODE: 2183908 B.E.8th SEMESTER

Type of course: Application of Nanotechnology in Health care and medicines.

Prerequisite: Basic and applied knowledge of Nanotechnology and Biotechnology.

Rationale: To make students understand the use of nanotechnology in health care as medicines or medical monitoring systems.

Teaching and Examination Scheme:

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							
3	2	0	5	70	20	10	30	0	20	150

Content:

Sr. No.	Content	Total Hrs.	% Weightage
1	Introduction Cellular Nanomachines and the Building Blocks of Life, A New Generation of Nanotools, Importance of various nanomaterials in health and medicine.	10	20%
2	Nanoparticles for Diagnostics: Nanoparticles in Medical Diagnostics and Therapeutics, Targeted drug delivery, Magnetic Nanoparticles as Contrast Agents for Medical Diagnosis, Liposome based delivery, Bio-Inspired Nanomaterials for a New Generation of Medicine.	12	25%
3	Therapeutic Nanodevices Definition and scope, Synthetic Approaches: top-down versus bottom-up Approaches for Nanotherapeutic Device Components, Applications for Nanotherapeutic Devices.	08	20%
4	Nanosystems for Healthcare Monitoring Single-Molecule Detection Techniques for Monitoring Cellular Activity at the Nanoscale Level, Nanoprobes, Integrated Cantilever-Based Biosensors for the Detection of Chemical and Biological Entities, Nanopore Methods for DNA Detection and Sequencing, Nanotube-Based Membrane Systems, micro/nano fluidic systems for bio-object sorting, single chip electrophoresis system.	18	35%

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level

17	22	21	10	-	-
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Legends: R: Remembrance; U = Understanding; A = Application 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. Tuan Vo-Dinh, Nanotechnology in Biology and Medicine: Methods, Devices, and Applications, CRC press, 2006.
2. Chala Kumar, Biofunctionalization of nanomaterials, Wiley, 2005.
3. Charles Pooles, Frank J. Ownes, Introduction to Nanotechnology, Wiley, 2003.
4. Bharat Bhushan, Handbook of Nanotechnology, Springer, 2003.

Course Outcome:

After learning the course the students should be able to understand:

1. Applications of nanotechnology health care and medicine.
2. Importance of nanomaterials in drug delivery.
3. Application of nanomaterials and nanosystems in Medical Diagnostics and Therapeutics.
3. Application of nanotechnology in health monitoring systems.

List of Open Source Software/learning website:

<http://ocw.mit.edu/courses/materials-science-and-engineering/>

<http://www.nanosworld.com/nano/education>

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.