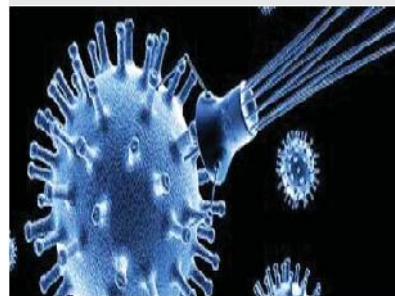


16BT401 NANOBIO TECHNOLOGY

Hours Per Week :

L	T	P	C
3	-	-	3



Source:
www.apicetech.com

Course Description and Objectives:

This course combines physical laws, chemical procedures and biological principles in the nano-scale. The objective of the course is to enrich students with important applications of nanobiotechnology in a range of fields like medical diagnosis, drug delivery, detection of bio-macromolecules in complicated biochemical systems etc.

Course Outcomes:

Upon completion of the course, the student will be able to

- CO1: Designing of reduction in materials dimensionality and its relationship with materials properties.
- CO2: Synthesize nanomaterial's by using physical and chemical methods based on their dimensionality.
- CO3: Evaluate the nanoparticles for drug delivery applications.
- CO4: Develop the Nano-biosensors- insight into the use of Nanotechnology in biomedical, microelectronics and optical applications.
- CO5: Understanding of approaches for Nanomaterial fabrication & Nanotechnology tools.

SKILLS:

- ✓ *Prepare nanoparticles from organic oils.*
- ✓ *Charaterize nanoparticles by analytical and imaging systems.*
- ✓ *Evaluate safety of nanoparticles on cell lines.*

ACTIVITIES:

- *Design new therapeutics and targeted drug delivery vehicles for cancer, arthritis, neurological and other important diseases.*
- *Novel formulation to enhance the efficacy of existing drugs.*
- *Detection and imaging for early disease diagnosis.*
- *Design and develop smart nanomaterial for bioseparation, tissue engineering and other medical applications.*

UNIT - 1

L-9

INTRODUCTION: Scope and overview; Length scales; Importance of nanoscale and technology; History of nanotechnology; Future of nanotechnology- nano technology revolution, silicon based technology; Benefits and challenges in molecular manufacturing; The molecular assembler concepts.

UNIT - 2

L-9

NANO PARTICLES: Introduction; Types of nanoparticles; Techniques to synthesize nanoparticles; Characterization and application of nanoparticles - toxic effects of nanomaterials, significance of nanoparticles; Nanofabrications- MEMS/NEMS; Atomic force microscopy; Self assembled monolayers/ dip-pen nanolithography; Soft lithography; PDMS moulding; Nano wires and nanotubes.

UNIT - 3

L-9

APPLICATIONS - I : Nanobiosensor and nanofluids; Nanocrystals in biological detection; Electrochemical DNA sensors and integrated nanoliter systems; Nano-biodesives and systems; Fabrication of novel biomaterials through molecular self assembly- small scale systems for *in vivo* drug delivery; Future nanomachines.

UNIT - 4

L-9

APPLICATIONS- II: Clinical applications of nanodevices; Artificial neurons; Real-time nanosensors- applications in cancer biology, nanomedicine; Synthetic retinyl chips based on bacterio rhodopsins. High throughput DNA sequencing with nanocarbon tubules; Nanosurgical devices.

UNIT - 5

L-9

ETHICAL ISSUES IN NANOTECHNOLOGY: Introduction; Socio-economic challenges; Ethical Issues in nanotechnology with special reference to nanomedicine applied in nonmedical contexts; Nanotechnology and future socio-economic challenges.

TEXT BOOKS:

1. C. M. Niemeyer and C. A. Mirkin, "Nanobiotechnology: Concepts, Applications and Perspectives", 1st edition, Wiley-VCH, 2006.
2. J. Liu and K. Shimohara, "Biomolecular Computation by Nanobiotechnology", 1st edition, Artech House, 2007.

REFERENCE BOOKS:

1. R. S. Greco, "Nanoscale Technology in Biological Systems", 1st edition, CRC Press. 2005.
2. H. S. Nalwa, "Handbook of Nanostructural Biomaterials and their applications in Nanobiotechnology", 1st edition, American Scientific Publishers, 2005.
3. V. Vogel, "Nanotechnology: Volume 5: Nanomedicine and Nanotechnology", 1st edition, John Wiley and Sons Limited, 2008.