

Course Focusing on Human Values and Professional Ethics

Programme Code:	AP	Programme Title: B.Sc	Biochemistry	
Course Code:	19UAPST405	Title: SKILL BASED COURSE II - NANOTECHNOLOGY AND CLINICAL TRIALS	Batch:	2019 -2020 Onwards
Hours/Week:	3		Semester:	IV
			Credits:	3

Objectives

- To understand and get familiarized with the fundamentals of Nanotechnology
- To give a general introduction to different classes of nanomaterials and impart basic knowledge on characterization techniques involved in Nanotechnology
- To make the learner familiarize with the applications of nanotechnology in various fields
- To identify key operational requirements, data management and regulatory affairs in clinical trials

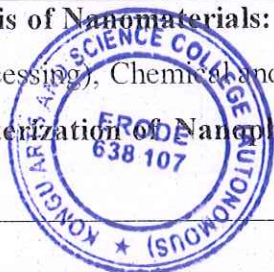
Course Outcomes

On the successful completion of the course, students will be able to

K1	CO1	Gain the fundamentals of Nanotechnology and to get knowledge familiarize with the new concepts of Nano science and Technology.
K2	CO2	Ability to manipulate matter at molecular scale and attain the principal classes of biomaterials and their functionalities in modern medical science.
K3	CO3	Impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
K4	CO4	Acquire the outline interest of research about health care and study population.
K5	CO5	Attain general basics related to document development used in clinical trials.

Syllabus

Unit	Content	Hours
I	Nanotechnology: Introduction, Definition, Nanoscale. Classification of Nanomaterials: Based on Origin, Dimension and Structural configuration. Applications: Nanotechnology in Medicine, Textile, Food and Agriculture.	5
II	Properties of Nanostructured Materials: Size and Shape dependent properties – Colour, Optical properties, Electrical Conductivity, Magnetic properties, Thermal properties and Band Gap. Nanomaterials: Quantum Dots, Nanowires, Carbon-based Nanomaterials (CNTs), Metal based nanomaterials – Nanogold and Nanosilver, Metal oxide Nanoshells – Zirconia and Silica Nanoshells.	6
III	Synthesis of Nanomaterials: Top – Down (Ball Milling), Bottom – Up (Sol-Gel Processing), Chemical and Green synthesis of Nanoparticles. Characterization of Nanomaterials: XRD, FTIR, EDX, FESEM, FETEM	5



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IV	<p>Research Design and Overview of Clinical Trials: Definition of Clinical Trial. Types of Clinical Trials. Planning and execution of Clinical trials - formulating research questions. Study population - Sample size determination.</p> <p>Various Phases of Clinical trials: Phase-I, Phase-II, Phase-III and Phase-IV trials.</p>	6
V	<p>Documents in clinical study: Essential Documents in Clinical Trial - Investigator Brochure (IB), Case Report Form (CRF), Good Clinical Practice: ICH Guidelines, ICMR Guidelines.</p> <p>Clinical Trial Applications: New Drug Application (NDA). Clinical Trial Applications in India.</p>	5
TOTAL		27

Teaching Methodology:

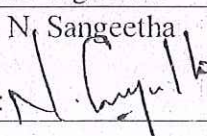
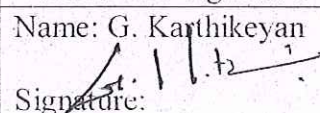
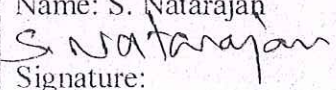
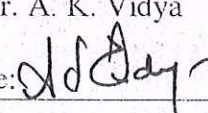
Chalk and Talk, PPT, Oral Discussion, Demonstration

Books for Study:


1. Pradeep T, Nano: The Essentials Understanding Nanoscience and Nanotechnology, 1st Edition, Tata McGraw – Hill Publishing Company Limited, 2007.
2. Lakshman Desai, Nanotechnology, 1st Edition, Paragon International Publishers, 2007.
3. BhaskarMazumder, Nanotechnology: Therapeutic, Nutraceutical, and Cosmetic Advances, 1st Edition, CRC Press, 2019.

Books for Reference:

1. R Bruce Weisman, Handbook of Carbon Nanomaterials (Volumes 9-10) (World Scientific Carbon Nanoscience), 1st Edition, World Scientific Publishing Company, 2019.
2. Design and Analysis of Clinical Trials Concepts and Methodologies, Second Edition Shein-Chung Chow, Jen-Pei Liu, Wiley – Interscience, A John Wiley & Sons, Inc Publication

Course Designed by	Verified by	Checked by	Approved by
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