

# CAREER DEVELOPMENT CENTRE



Date: 28<sup>th</sup> December 2022.

**Subject: Value Added Trainings School of Pharmaceutical and Population Health Informatics**

**Attention: M.Pharm- II Semester / B.Pharm- VIIIth Semester (Session-EVEN-2022-23)**

Above mentioned students are hereby informed that as per the approved value added trainings for the academic year 2022-23, Career Development Centre offers the below mentioned technical training in the Even Semester (2022-23). Details as follows:

Training	Semester	Program	Duration	Date of Commencing
Nano Technology and Nano Sensors (VAT-73)	II	M.Pharm	36	7 <sup>th</sup> February 2023

**NOTE:**

1. The Department concerned shall notify the details about timings and venue of the training sessions. In case of any query please contact the Career Development Centre, DIT University.

  
Mr. Sandeep Baidoni  
Career Services Cell  
DIT University, Dehradun  
In Charge- CDC

**To:**

- All Deans / Directors
  - HoDs
  - CDC
- } With the request to bring the above to the notice of the students

**Copy for information to:**

- Hon'ble Chairman
- Hon'ble Chancellor
- Hon'ble Vice Chancellor
- Hon'ble Pro Vice Chancellor
- ICT Manager – to upload on website

## VAT 73- Nano Technology and Nano Sensors

**Venue:** Vedanta 305 | **Duration:** 36 Hrs ( 7<sup>th</sup> February 2023 – 02nd May 2023 )

Nanotechnology and Nanosensors are broad, interdisciplinary areas that encompass (bio)chemistry, physics, biology, materials science, electrical engineering and more. The present training provided a survey on some of the fundamental principles behind nanotechnology and nanomaterials and their vital role in novel sensing properties and applications. It was conducted by the **School of Pharmaceutical and Population Health Informatics**, the coordinator for the training was **Dr. Bhavna** (Assistant Professor, SoPPHI- DIT University and **M.Pharm (IInd Semester)** were offered this value added training.

### **OBJECTIVE:**

The course main objective is to enhance critical, creative, and innovative thinking. The course encourages multicultural group work, constructing international 'thinking tanks' for the creation of new ideas. Throughout the course, you will be asked to reflect upon your learning, think "out of the box", and suggest creative ideas.

The course is set to encourage the understanding of:

1. The importance of nanoscale materials for sensing applications.
2. Approaches used for characterizing sensors based nanomaterials.
3. Approaches used for tailoring nanomaterials for a specific sensing application.
4. Metallic and semiconductor nanoparticles.
5. Organic and inorganic nanotubes and nanowires.
6. Optical, mechanical and chemical sensors based on nanomaterials.
7. Hybrid nanomaterial-based sensors.

## **TRAINING OUTLINE:**

**Module 1: Introduction to Nanotechnology:** Definition of nanotechnology; main features of nanomaterials; types of nanostructures (0D, 1D, and 2D structures); nanocomposites; and main chemical/physical/electrical/optical properties of nanomaterials.

**Module 2: Introduction to Nanotechnology - continue:** Methods for characterizing the nanomaterials: Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and spectroscopy- and spectrometry-based surface analysis techniques. Fabrication of sensors by bottom-up and top-down approaches; self-assembly of nanostructures; and examples for nanotechnology application

**Module 3: Introduction to Sensors' Science and Technology:** Definition of sensors; main elements of sensors; similarities between living organisms and artificial sensors; working mechanism of physical sensation (seeing, hearing, and feeling) and chemical sensation (smelling and tasting); the parameters used for characterizing the performance of sensors: accuracy, precision, sensitivity, detection limit, dynamic range, selectivity, linearity, resolution, response time, hysteresis, and life cycle.

**Module 4: Metal nanoparticle-based Sensors:** Definition of nanoparticle; features of nanoparticles; and production of nanoparticles by physical approach (laser ablation) and chemical approaches (Burst method, seed-mediated growth, etc.).

**Module 5: Quantum Dot Sensors:** Definition of quantum dot; fabrication techniques of quantum dots; Macroscopic and microscopic photoluminescence measurements; applications of quantum dots as multimodal contrast agents in bioimaging; and application of quantum dots as biosensors.

**Module 6: Nanowire-based Sensors:** Definition of nanowires; features of nanowires; fabrication of individual nanowire by top-down approaches and bottom-up approaches; and fabrication of nanowire arrays (fluidic channel, blown bubble film, contact printing, spray coating, etc.).

**Module 7: Carbon Nanotubes-based Sensors:** Definition of carbon nanotube; features of carbon nanotubes; synthesis of carbon nanotubes; fabrication and working principles of sensors based on individual carbon nanotube; fabrication and working principles of sensors based on random array of carbon nanotubes.

**Module 8: Sensors Based on Nanostructures of Metal Oxide:** Synthesis of metal oxide structures by dry and wet methods; types of metal oxide gas sensors (0D, 1D, and 2D); defect chemistry of the metal oxide sensors; sensing mechanism of metal-oxide gas sensors; and porous metal-oxide structures for improved sensing applications.

**Module 9: Mass-Sensitive Nanosensors:** Working principle of sensors based on polymeric nanostructures; sensing mechanism and applications of nanomaterial-based of chemiresistors and field effect transistors of (semi-)conductive polymers, w/o inorganic materials.

**Module 10: Arrays of Nanomaterial-based Sensors:** A representative example for the imitation of human senses by means of nanotechnology and nanosensors: electronic skin based on nanotechnology.

**Minimum Eligibility Criteria:**

Nanotechnology and Nano sensors are broad, interdisciplinary areas that encompass (bio) chemistry, physics, biology, materials science, electrical engineering and more.

**Training Outcomes:**

By the end of the course, students will understand the fabrication, characterization, and manipulation of nanomaterials, Nano sensors, and how they can be exploited for new applications. Also, students will apply their knowledge of nanotechnology and Nano sensors to a topic of personal interest in this course.

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## Value added course Details (Academic Year: 2022-23)

VAT Course Name: Nano Technology and Nano Sensors

VAT Code: VAT 73

Duration in Hours: 36

Number of Students Enrolled:30

Number of Students Completed: 25

**Grades:**

**G= GOOD ; S = Satisfactory ; P = Poor ; W = Withdraw**

Student ID	Student Name	Program/Course	Year	Passing Grade
225795001	KARAN JOSHI	Master of Pharmacy in Pharmacology	2022-2024	S
225740002	SUDHANSHU BIJALWAN	Master of Pharmacy in Pharmaceutics	2022-2024	S
225795003	NITESH KUMAR GUPTA	Master of Pharmacy in Pharmacology	2022-2024	S
225795004	SHRISTI GUPTA	Master of Pharmacy in Pharmacology	2022-2024	P
225795005	PRABISH MITRA	Master of Pharmacy in Pharmacology	2022-2024	S
225795006	RICHA SINGH	Master of Pharmacy in Pharmacology	2022-2024	S
225740003	YASHWANT KUMAR TIWARI	Master of Pharmacy in Pharmaceutics	2022-2024	S
225795007	NEHA	Master of Pharmacy in Pharmacology	2022-2024	S
225740004	ANURAG CHAUHAN	Master of Pharmacy in Pharmaceutics	2022-2024	S
225795008	SHAVEJ	Master of Pharmacy in Pharmacology	2022-2024	S
225740005	ANUGYA CHAUHAN	Master of Pharmacy in Pharmaceutics	2022-2024	S
225740006	RANI MANDAL	Master of Pharmacy in Pharmaceutics	2022-2024	P
225740008	AVNISH CHAUHAN	Master of Pharmacy in Pharmaceutics	2022-2024	S
225795009	SHAH NAWAZ	Master of Pharmacy in Pharmacology	2022-2024	S
225740010	SIPUKUMAR SAHU	Master of Pharmacy in Pharmaceutics	2022-2024	S
225740011	SIBASANKAR SAHU	Master of Pharmacy in Pharmaceutics	2022-2024	P
225740013	DEBASIS GANTAYAT	Master of Pharmacy in Pharmaceutics	2022-2024	S
225740015	CHIRAG SHARMA	Master of Pharmacy in Pharmaceutics	2022-2024	S
225795010	CHAND BABU	Master of Pharmacy in Pharmacology	2022-2024	S
225740017	SIDDHANT SHARMA	Master of Pharmacy in Pharmaceutics	2022-2024	P
225795011	SAHIL KHAN	Master of Pharmacy in Pharmacology	2022-2024	S
225795012	PUNEET KUMAR	Master of Pharmacy in Pharmacology	2022-2024	S
225740018	MOHD FAISAL	Master of Pharmacy in Pharmaceutics	2022-2024	S
225740020	DEEPSHIKHA GHORAI	Master of Pharmacy in Pharmaceutics	2022-2024	S
225740022	HARSHIT KUMAR	Master of Pharmacy in Pharmaceutics	2022-2024	S
225795014	KANCHAN SHARMA	Master of Pharmacy in Pharmacology	2022-2024	S
225795016	ANCHAL SOHTA	Master of Pharmacy in Pharmacology	2022-2024	S
225795017	VANSHIKA	Master of Pharmacy in Pharmacology	2022-2024	P
225740023	ABHISHEK RAWAT	Master of Pharmacy in Pharmaceutics	2022-2024	S
225795019	VANSH SETH	Master of Pharmacy in Pharmacology	2022-2024	S

Career Services Cell  
DIT University Dehradun