

# Nanotechnology Mastery Blueprint

Certificate course in

## Nanotechnology and its Applications Veterinary Perspective



For the fast moving science and technology, the present generation must understand the concept, approach and different applications of the newly emerging field so called "Nanotechnology".

For the 1<sup>st</sup> time in India, Nano-RAM Technologies has initiated a **certificate course** for the benefit of different students with background of Engineering, Pharmacy, Medicine, Dental, Veterinary, and Science.

The nanotechnology certificate course is designed for: students with the following background (3<sup>rd</sup> year and 4<sup>th</sup> year students of B.Ve.Sc) (1<sup>st</sup>/2<sup>nd</sup> year M.Ve.Sc students)

**Pharma Branches:** Pharmaceutics, Pharma analysis, Pharma Chemistry, Pharmacology, Pharmacognosy, Biopharmaceuticals,

**Certificate course in- Nanotechnology Mastery Blueprint "Nanotechnology and its applications– Pharma Perspective"**

### Introduction to Nanotechnology

A biological system can be exceedingly small. Many of the cells are very tiny, but they are very active: they manufacture various substances: they "walk around" and they do all kinds of marvelous things- all on a very small scale. Also they store information. Consider the possibility that we can make a thing very small that does what we want—that can manufacture an object that maneuvers at that level.

- **Nanotechnology Definition pharma perspective, Background on Research expenditures**
- **Lessons from nature, Various pharma issues, Classification of nanomaterials**

### Processing of nanomaterials

The constituent components of conventional devices are carved out of larger materials relying on physical methods. This top-down approach to engineered building blocks becomes increasingly challenging as the dimensions of the target structures approach the nanoscale. Nature, on the other hand, relies on chemical strategies to assemble nanoscaled biomolecules. Small molecular building blocks are joined to produce nanostructures with defined geometries and specific functions. It is apparent that nature's bottom up approach to functional nanostructures can be mimicked to produce artificial molecules with nanoscaled dimensions and engineered properties.

#### - Physical methods

e-beam deposition, magnetron sputtering deposition, pulsed laser deposition, thermal deposition, MBE, Atomic layer, etc.,

#### - Chemical methods

Chemical vapor deposition, Plasma assisted chemical vapor deposition, Electrochemical deposition, Electrophoretic deposition, Sol-gel deposition, Langmuir-Blodgett deposition, Electrospinning technique, self-assembled monolayers, Microwave irradiation, gamma irradiation, co-precipitation, sonochemical reaction, hydrothermal, solvothermal chemical reactions, templated assisted deposition techniques etc.,

### Characterization of nanomaterials

Characterization and manipulation of individual nanostructures require not only extreme sensitivity and accuracy, but also atomic level resolution. It therefore leads to various spectroscopic and microscopy that will play a central role in characterization and measurements of nanostructured materials and nanostructures. Miniaturization of instruments is obviously not the only challenge: the new phenomena, physical properties and short range forces, which do not play a noticeable role in macroscopic, level characterization, may have significant impacts in the nanometer scale. The development of novel tools and instruments is one of the greatest challenges in nanotechnology.

### Nanotechnology Mastery Blueprint Course

- Duration 8h (followed by online for 6M)**
- Fee Rs. 1,999/- per student (including GST)**
- Consignment of 50 students (min. 25 to start)**
- Certificate issued by- Nano-RAM Technologies**
- Designed for 3<sup>rd</sup> / 4<sup>th</sup> year B.Ve.Sc students**
- 1<sup>st</sup> / 2<sup>nd</sup> year M.Ve.Sc students**



#### - Spectroscopy techniques

Ultra-violet visible spectroscopy, Fourier Transform Infra Red spectroscopy, X-ray Diffraction, Thermo Gravimetric Analysis, Differential Thermal Analysis, X-Ray Photoelectron spectroscopy, Auger Electron Spectroscopy, Particle Size Analyser, BET, etc.,

#### - Microscopy techniques

Scanning Electron Microscopy, Transmission Electron Microscopy, Scanning Tunnelling Microscopy, Scanning Probe Microscopy, Atomic Force Microscopy, Vibration Spectrometer, SQUID, Magnetic Force Microscopy, etc.,

#### Emerging Nanoengineered materials for all branches:

Nanoscale Cancer Therapeutics, Nano therapeutics for Skin Diseases, Nanoparticles for Oral Vaccination, Nanoparticles: for Bacterial / Parasite Diseases, Nanogels, Thermoreversible gels, Nanodermal patches for drug delivery, Nanoformulations for improved efficacy of drug delivery, Nanostructured oral thin films, Nanocoatings for tablets, nanomaterials for cosmeceuticals, nutraceuticals, etc.,

### Rtn. Dr.A.Phani Ratna

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#### Managing Director

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Karnataka State, INDIA

**Profile:** (15 years abroad, 13 years Industrial, 10 years academic experience)

1. High-tech know-how, competencies and expertise in nanotechnology to meet industrial needs and strengthen industrial competitiveness in Asia, Europe, and USA. 2. Expertise in the field of the Materials Engineering / Pharmaceutical Technology and service in advanced technology and product development. 3. State of art facility for all Synthesis / deposition / characterization and testing techniques. 4. Scale up process for the developed micro / nanomaterials. 5. Developed 54 nanotech based products and marketing in India / Global 6. Published 272 International publications, 12 Indian patents, 18 national & 3 International awards





## Nanotechnology and its Applications At a glance Veterinary Perspective

### Products based on nanomaterials for various branches

#### a. Pharmaceuticals

- Nanoparticles of drug: Particle size reduction, Emulsions, Colloidal dispersions, etc., Nano effect on: digestive, respiratory, central nervous system, urinary, reproductive, endocrine, sense organs etc., mechanism involved: Cell injury, inflammatory and repair, pathophysiology of common diseases. Liquid dosages, solids, fibers, oral films etc., related to Veterinary / Animal / Aquatic

#### b. Pharma analysis

- Nanomaterials characterization: GCMS, HPLC, X-Ray Diffraction, High resolution Scanning Electron Microscopy, Particle size analyser, High Resolution Transmission Electron Microscopy etc.,

#### c. Pharma Chemistry

- Nanodrugs for: Drug metabolism and Concepts of Prodrugs. Synthetic procedures of selected drugs, mode of action, uses, structure activity relationship (including physicochemical aspects) of the following classes of drugs: Antineoplastic agents, Anti-viral including anti – HIV agents., Immuno-suppressive and immuno-stimulants, etc.,

#### d. Pharmacology

- Nanomaterials for: Clinical Pharmacokinetics and individualization of nanodrug Therapy, Nanodrug delivery systems and their Biopharmaceutic & Therapeutic considerations, Nanodrug Use during infancy and in the elderly (Pediatrics & Geriatrics), Nanodrug use during Pregnancy, Nanodrug induced Diseases (diabetic, cancer), Basics of nanodrug interactions etc., related to Veterinary / Animal / Aquatic

#### e. Biopharmaceutical

- Nanomaterials (drug): passage of drugs across biological barrier, influence of absorption, distribution in the body, pharmacokinetics, clinical pharmacokinetics, bioavailability and bioequivalence, immunological preparations, genetic recombination, antibiotics, enzyme immobilization, microbial transformation, biologics, etc., related to Veterinary / Animal / Aquatic

#### f. Biotechnology :

- Nanomaterials for: Bacterial, Fungal and Virus inhibition, Fermentation, Enzymes, Immunology, Biosensors, food contamination identification, Membranes, DNA, RNA, Cloning, Healthcare, Nutraceutical, Biopharmaceutical industries etc., related to Veterinary / Animal / Aquatic

#### g. Animal husbandry, Biochemistry, Osteology, Live Stock, List of Nanotech organizations / companies in world wide related to veterinary / Animal / Aquatic

Microbiology, Pathology, Histology, viral diseases, Parasitic diseases, Milk hygiene, aquatic animals, Toxicology, Andrology, Dystocia, Pedigree, etc.,

#### Projects for internship in Nanotechnology

Several small (Thesis work program with duration of 3M / 6M / 12M) projects in different branches are identified for the benefit of students. Interested students can contact for more information to carry out their internship program either with Nano-RAM Technologies or in collaboration with Nano-RAM Technologies and parent institution.

**Advantage:** Enrolled students will be given access to view the elaborate course material, videos with examples with a given password and will be taken care to guide for their career counselling for higher studies as well as career settlement and life time member for

[www.nanotechcareerhub.com](http://www.nanotechcareerhub.com) and

[www.nanotechlinkformula.com](http://www.nanotechlinkformula.com) for better network opportunities with the same branch of Vet.Sc. as well as with other colleges in India. Access to all Personality development programs on website.

For more information visit:

[www.nanoramtechnologies.com](http://www.nanoramtechnologies.com) Mobile: +91-9880400737 (WA)  
director@nanoramtechnologies.com

#### Veterinary industrial Applications of nanomaterials:

- Nanoformulated materials: antinflammatory. Antiepileptic, antifungal, antigout, antineoplastic, antiparkinson, anxiolytic, antithyroid drugs for to improve bioavailability and efficacy. Transparent nanostructured coatings for tablets, Nanochemicals as excipients, Oral thin films, Healthcare coatings, Fire retardant coatings, Bird repellent coatings, RFID based devices Gas / Pressure / Biomedical sensors, Anticorrosion coatings.,



**Nano: Spheres, Porous, Wires, Fibers, Films, Particles  
For Veterinary / Animal / Dairy / Aquatic Applications**

<img alt="A collage of images related to nanotechnology applications in veterinary, animal, dairy, and aquatic fields, including a sy