

## BIO-635 Nanotoxicology

**Content** The number of materials and devices produced using nano technology is rapidly growing. With recent advances in the field, nano materials and nano particles start to be widely used in all fields of life. In order to avoid eventual health problems, documentation of the effects of nano particles and materials on organisms and cells is of utmost importance. During the nanotoxicology course, the effects of nano particles and materials on human health and, stress, disease and death responses of the organisms and cells to nano particles and materials will be analyzed and discussed from a molecular biology perspective. Nano particles/materials in industry and in the environment, methods to study nanotoxicology, organismal responses to nanomaterials, entry-uptake, faith of nano particles in cells and cellular and molecular stress and death responses against them will be covered during the course.

### Syllabus:

Week	Subject
<b>1-2</b>	<b>Introduction to Nanotechnology and Nanomedicine</b>
	Nanodevices and Nanomaterials
	Major problem in treatment of many diseases
	Advantages of Nano-delivery Systems
<b>3</b>	<b>Designing Nanoparticles for Therapeutics</b>
	Types of Therapeutic Nanoparticles
	Type of Nanostructured Nanoparticles
	Nanocrystalline Particles in Nanomedicine
<b>4</b>	<b>Nanotoxicity and human health</b>
	Fate of nanomaterials in the body: short term and long term effects
<b>5</b>	<b>Determination of Toxicity</b>
	In vitro and in vivo study of the effect of nanoparticles on mammalian cells and tissues
<b>6</b>	<b>Characterization Methods of Nanoparticles</b>
	DLS, TEM, SEM etc.
<b>7-14</b>	<b>Current Application of Nanoparticles in Clinics</b>
	Nanoparticles for Cancer Therapy
	Nanoparticles for Infectious Disease Therapy
	Nanoparticles for Autoimmune Disease Therapy
	Nanoparticles for Cardiovascular Disease Therapy
	Nanoparticles for Neurodegenerative Disease Therapy
	Nanoparticles for Ocular Disease Therapy
	Nanoparticles for Pulmonary Disease Therapy
	Nanoparticles for Regenrative Therapy

### Course materials

#### Suggested textbook:

- 1- Nanotoxicity: From In Vivo and In Vitro Models to Health Risks, Editor(s): Saura C. Sahu  
Daniel A. Casciano
- 2- Nanotoxicity Methods and Protocols, Editors Joshua Reineke
- 3- Recent research articles