

**UOE016: World of Nano Science**  
(Version: 0.0, Open Elective, School of Sciences)

Lect.	Tut.	Practical.	Credits	Evaluation Scheme				
				Component	Exam	WT	Min Pass (%)	
2	-	-	2	Theory	FA	100	40	40

**Course Description:**

This course introduces Nanoscience's fundamentals, from nature's nanoscale marvels to its development through history. Explore nanomaterials (0D to 3D) like QDs, CNTs, and their properties (mechanical, optical, etc.). Discover applications across fields like medicine, computing, and materials.

**Course Outcomes:**


<b>CLO1</b>	Discover nature's small-scale wonders, from butterfly colors to gecko grip.
<b>CLO2</b>	Explore the evolution of nanoscience that has shaped our world.
<b>CLO3</b>	Achieve mastery in understanding nanomaterial dimensions, types, and generations.
<b>CLO4</b>	Grasp nanoscience essentials, from quantum mechanics to surface properties.


**Syllabus (Theory)**

Units	Description	Hours
	<b>Introduction to Nanoscience</b>	
<b>I</b>	Introduction, Nano and Nature: Nanoscopic colors (Butterfly wings), Bioluminescence (fireflies), Tribology (Gecko's Sticky Feet, Nasturtium Leaf-Lotus effect etc) in nature. The development of nanoscale science: size scale, Nanotechnology Timeline: Pre-18th Century: 19th Century, 20th Century, 21st Century. Generations of nanotechnology. Classification of nanomaterials:0D,1D,2D and 3D and types of nanomaterials (QDs, QW, CNT's, Bucky Balls, Nanocomposites etc) Nanoscience: quantum mechanics, Brownian motion, surface forces, surface to volume ratio.	<b>15</b>
	<b>Properties of Nano Materials and Their Applications</b>	
<b>II</b>	Introduction, Size-Dependent Effects, Surface and Interface Properties, Mechanical and Thermal Behavior, Electrical, Optical, and Magnetic Properties, Surface Plasmon effects, Biological Interactions, Application in field of pharmaceutical science, material science, Computer science, metallurgy, Chemical engineering, medical and health Science.	<b>15</b>

### Reference books:

1. Nanotechnology: Technology Revolution of 21st Century by Rakesh Rathi, published by S.Chand.
2. Introduction to Nanoscience, by Stuart Lindsay.
3. Introduction to Nanomaterials and nanotechnology by Vladimir Pokropivny, Rynno Lohmus, Irina Hussainova, Alex Pokropivny and Sergey Vlassov
4. Nanomaterials by A.K. Bandyopadhyay; New Age International Publishers.
5. Nanotechnology by Mark Ratner and Daniel Ratner, Pearson Education.
6. Nano Essentials- T.Pradeep/TMH
7. Bharat Bhusan, "Springer Handbook of Nanotechnology", springer, Newyork, 2007.
8. Hari Singh Nalwa, "Encyclopedia of Nanotechnology", USA 2011.
9. James A. Schwarz, Cristian I. Contescu, Karol Putyera, "Dekker encyclopedia of Nanoscience and nanotechnology" CRC Press, 2004.

  
HOD

  
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