



FORMAT FOR COURSE CURRICULUM

Course Title: NANOSCIENCE AND TECHNOLOGY Course Code:
Credit Units:3

L	T	P/S	SW/F W	TOTAL CREDIT UNITS
3		6	-	6

Course Objectives: Introduction to nanoscience and nanotechnology including concept of quantum electronics, nanoscale fabrication techniques, nanomaterials i.e., CNT and fullerenes.

Pre-requisites: Basic knowledge of material science

Student Learning Outcomes:

- The students will identify the different methods of synthesis and fabrication of nanostructures and their applications.
- Students will explain the applications based on specific properties

Course Contents/Syllabus:

	Weightage %
Module I Introduction to Nanoscale Science:	20
Descriptors/Topics Concept of quantum electronics, Molecules as building blocks of nanomaterials, Band energy etc.	
Module II Introduction to Nanoscale Technology	20
Descriptors/Topics Nanoscale fabrication techniques, Molecular self-assembly, Wet chemical synthesis, Top down and bottom up approaches.	
Module III Nanostructured Materials:	20

Descriptors/Topics Buckyballs, Nanoparticle preparation in emulsion and microemulsion, Nanostructures and nanoparticles in thin organic films, Amphiphiles and surfactants.	
Module IV Applications of Nanomaterials:	20
Descriptors/Topics Details of nanostructured materials, Applications in sensors, clothes, paints, health care, electronics, computers and other industrial and consumer products.	
Module V Fullerenes and Carbon Nanotubes:	20
Descriptors/Topics Importance, Properties and application of CNT and Fullerenes	

Pedagogy for Course Delivery:

The class will be taught using theory and experimental based examples. In addition to this, the student will be exposed to new research frontiers related to the topic.

Lab/ Practicals details, if applicable: Yes

List of Experiments:

- Synthesis and characterization of metal nanoparticles (Ag,Cu, Au etc.)
- Synthesis and characterization of semiconducting nanoparticles (CdS, ZnS,PbS etc.)
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Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
30	30	

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Assignment	Class test	Quiz/viva/seminar	Attendance	Theory
Weightage (%)	5	15	5	5	70

Lab/ Practical/ Studio Assessment:

Continuous Assessment/Internal Assessment					End Term Examination		
Components (Drop down)	Assignment	Class test	Quiz/viva/seminar	Attendance	Ex	Ex-copy	Viva
Weightage (%)	5	15	5	5	70	10	20

Text & References:

- Nielsen M.A., Chuang I.L. Quantum computation and quantum information- ex. Solutions
- Nano Electronics and Information Technology: Rainer Waser
- Nanoelectronics & Nanosystems: From Transistor to Molecular & Quantum Devices: Karl Goser, Peter Glosekotter, Jan Dienstuhl., Springer, 2004
- Nanotechnology: basic science and emerging technologies – Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005)

Any other Study Material: