Course Type	Course Code	Name of Course		Т	Р	Credit
DP	NCYC526	Material Chemistry Lab	0	0	3	1.5

Course Objective														
٠	The	idea	of	practical	classes	is	to	provide	students	an	exposure	to	various	materials
	preparation techniques and their characterizations.													

• The students will learn to synthesize, modify and utilize nanoparticles for various applications.

Learning Outcomes

• The students will have hands-on experience with different synthesis process and characterization techniques in combination to identify the materials and evaluate their performance.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome				
1	Synthesis and Characterization of Graphene.	03	Preparation methodology of Graphene and their characterization by RAMAN, FTIR, XRD and UV.				
2	Preparation of Conducting Polymers by Electrochemical Methods and Demonstration of a Polymer Battery	03	Electrochemical methods of synthesis of conducting polymer and its use as Battery.				
3	SynthesisofCore-Shellnanomaterialsforwastechemicalremovalfrom water.	03	Application of core-shell nanomaterials for waste treatment.				
4	Synthesis of Conducting ink and characterization.	03	Influence of conducting media, binder, particle size and loading on conductivity.				
5	Functional group (-OH, -COOH, CONH ₂ , etc) determination of surface modified nanoparticles using IR spectroscopy.	03	Synthesis and surface modification of Nanoparticles and characterization.				
6	Estimation of band-gap for Cu nanoparticles using absorption spectroscopy	03	Synthesis of copper nanoparticle and estimation of band gap by UV-vis spectroscopy.				
7	Synthesis of Fluorescent Carbon Quantum Dots.	03	Synthesis of quantum dots and measurement of their properties.				
8	Quantification of compounds using Cyclic Voltammetry	03	Utilization of CV for quantification of compounds in unknown solutions.				
9	Shape Control Synthesis of ZnO nanoparticle and characterization	03	Synthetic protocols for shape-controlled synthesis of nanoparticles.				
10	Synthesis and functionalization of porous silica nanoparticle.	03	Controlled synthesis of porous mediums and their functionalization and characterization.				
11	Synthesisandthermalcharacterizationofpolymernanocomposite	03	Utilization of DSC/TGA for thermal analysis of Polymers				

12	Glucose Determination Using Carbon	03	Synthesis and modification of sensors			
	Nanotube Modified Biosensor	05	for determination of glucose.			
13	Preparation and Characterization of		Electrode preparation and cell assembly			
	electrochemical energy storage	03	and performance evaluation of			
	device		Electrochemical energy storage device.			
14	Synthesis of TiO ₂ nanoparticle for	02	Synthesis and characterization of TiO ₂			
	photocatalysis	03	nanoparticle for photocatalysis.			
	Total	42 L				

Reference Books:

- 1. Journal of Chemical Education,
- 2. Textbook of Nanoscience and Nanotechnology, T. Pradeep, ISBN: 9781259007323 .