Open Course Title: **Multifunctional, Hybrid and Nano-materials for Engineering Applications**

Target Students from Branches: ECE/TCE/CSE/ISE/Mech

Total duration of the course: 25 Hours.

No. of Lecture hours: 12

No. of hands on / Practical: 13

Abstract

Title of the course: **Multifunctional, Hybrid and Nano-materials for Engineering Applications**

LEDs have been widely utilized in general lighting purpose. A wide range of CCT can be achieved by mixing lights from warm-white and cold-white LEDs. The RGB-tricolor LEDs can emit the pure white `light; this open course will cover Introduction to Light Emitting Diode (LED) Principle of LED, LED Materials - Direct and Indirect Band Gaps, fabrication of WLED and their applications.

Carbon-based materials have shown great versatility because they can be chemically combined with other carbon-based materials and with a range of different elements to form strong covalent bonds. As a result, they exhibit excellent characteristics such as high strength, high density, and high hardness. From recent studies, it appears that materials based on graphene (GR) and carbon nanotubes (CNTs). In this sense, this course will address promising results to minimize these problems, such as CO_2 reduction, H_2 photo electro generation, batteries, clean energy from the oxygen reduction reaction (ORR), degradation of organic pollutants, and sensors.

Superconductors fantastic materials which exhibits remarkable changes in electrical properties when they are taken to very low temperatures, which is used in the production very high magnetic fields which is used in high speed trains and also in MRI.

At the end of the course, hands on training on Synthesis of multifunctional hybrid materials, FTIR, UV visible and Ramann spectroscopic techniques and also hands on training on removal of dye from industrial water waste will be given to all the enrolled students.

Open Course Details

CO1: Able to understand material properties and synthesis of materials
CO2: Able to apply characterization techniques
CO3: Able to analyze the materials for industrials applications

Schedule

Day 1:12/02/2019			
Time	**Topics**	**Resource Person Details**	**CO-PO Mapping**
9.00 am to 10.30 am	Multifunctional nanomaterial for LED lighting applications	Dr. Dhananjaya N, Associate Professor and Head, Physics	CO1- PO1, PO2, PO3
11.00 am to 12.30 pm	Carbon hybrid materials for versatile device applications	Dr. Kavitha C, Assistant Professor, Physics	CO1, CO3- PO1, PO3, PO7
1.30 pm to 4.00 pm	Lab Session :Hands on training on Synthesis of multifunctional hybrid materials	Dr. Dhananjaya N, Associate Professor and Head, Physics	CO2- PO4, PO5
Day 2:13/02/2019			
Time	**Topics**	**Resource Person Details**	**CO-PO Mapping**
9.00 am to 10.30 am	Superconductors and their applications	Dr. R. Lokesh, Associate Professor, Physics.	CO1, CO3- PO1, PO5
11.00 am to 12.30 pm	Carbon hybrid materials for versatile device applications	Dr. Kavitha C, Assistant Professor, Physics	CO1, CO3- PO1, PO3, PO7
1.30 pm to 4.00 pm	Lab Session :Hands on training on FTIR, UV visible and Raman spectroscopic techniques	Dr. Dhananjaya N, Associate Professor and Head, Physics And Dr. Kavitha C, Assistant Professor, Physics	CO3- PO4,PO5, PO6
Day 3:14/02/2019			
Time	**Topics**	**Resource Person Details**	**CO-PO Mapping**
9.00 am to 10.30 am	Physics of Nano electronics – Fundamentals to device level	Dr. Daruka Prasad, Assistant Professor, Physics	CO1, CO3
11.00 am to 12.30 pm	Superconductors and their applications	Dr. R. Lokesh, Associate Professor, Physics.	CO1, CO3- PO1, PO5
1.30 pm to 4.00 pm	Lab Session :Hands on training on removal of dye from industrial water waste	Dr. Dhananjaya N, Associate Professor and Head, Physics	CO3- PO5,PO6, PO7

Day 4:15/02/2019			
Time	**Topics**	**Resource Person Details**	**CO-PO Mapping**
9.00 am to 10.30 am	Physics of Nano electronics – Fundamentals to device level	Dr. Daruka Prasad, Assistant Professor, Physics	CO1, CO3
11.30 am to 3.30 pm	Industry visit- Applications of polymers in the manufacturing of automobile of components.	Suprajit Automobiles, Industrial area, Doddaballapur.	CO3-PO3
Day 4:16/02/2019			
Time	**Topics**	**Resource Person Details**	**CO-PO Mapping**
9.00 am to 10.30 am	Materials for Sensors	Dr. T. Rama krishnappa, Associate Professor and Head, Chemistry	CO1, CO3
11.00 am to 12.30 pm	Assessment of students during the open course by conducting Quiz		

Photos