



COURSE DESCRIPTION

Nanoscience and Nanotechnology are the interdisciplinary areas that encompass biochemistry, chemistry, physics, biology, materials science, electrical engineering and more.

Nanomaterials have attracted huge interest as a rapidly growing class of materials for many applications. The department of Physics is launching this course with a main objective of exploration of the world of nanoscience and nanotechnology to research scholars and students.

This course covers introduction to nanoscience & nanomaterials, effect of nanoscale dimensions on various properties of materials, material synthesis methods, characterization tools, applications of nanomaterials and nanocomposites. This certificate course, "Nanomaterial Synthesis & Characterization Techniques", will certainly help the students equipped with the understanding of fundamental principles of nanotechnology, development of nanomaterials and their applications.

COURSE OBJECTIVES

This course aims to explore the world of nanoscience and nanotechnology to the research scholars, final year UG & PG students. The students will be equipped with knowledge of synthesis, characterization and properties modeling approaches.

Organizer:

Dr. Waman S. Barde (H.O.D.)

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Coordinators:

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- ✓ Duration of the course: 5th Sept – 19th Sept 2022
- ✓ Total credits: 3 credits
- ✓ Eligibility:
 1. B.sc. III Sem V students.
 2. M.sc. Physics, chemistry students.
 3. Research scholars and faculty.
- ✓ Total seats available: 50 seats (offline)

COURSE OUTCOMES

After completing the course the students will be equipped with basic understanding of the following.

- Selection of synthesis methods that can be best suited for developing nanostructured materials.
- Synthesis approach for fabrication of inorganic 0D, 1D, 2D nanostructures.
- Importance of nano materials over bulk materials.
- Size dependent physical and chemical properties of nanomaterials.
- Selection of characterization tools (including X-ray diffraction, FTIR, UV-vis spectroscopy, electron microscopy techniques (SEM and TEM), etc), to characterize nanomaterials.
- Students will be capable to perform stoichiometric calculations of chemical reaction.
- Analysis and interpretation of data related to X-ray diffraction, UV-VIS spectra, FTIR spectra and other structural parameters.

COURSE LAYOUT

The course is divided into two modules.

Module 1: Introduction to Nanomaterials and their Synthesis

Lecture 1: Nanoscience and Nanotechnology I
Lecture 2: Nanoscience and Nanotechnology II
Lecture 3: Sol- gel synthesis
Lecture 4: Co-precipitation Method
Lecture 5: Hydrothermal synthesis
Lecture 6: Spray Pyrolysis Method
Lecture 7: Combustion Method
Lecture 8: Green Synthesis
Lecture 9: Microemulsion

Module 2: Characterization techniques

Lecture 1: X-ray diffraction I
Lecture 2: X-ray diffraction II
Lecture 3: FTIR I
Lecture 4: FTIR II
Lecture 5: UV-Vis spectroscopy I
Lecture 6: UV-Vis spectroscopy II
Lecture 7: SEM
Lecture 8: TEM
Lecture 9: TGA-DTA
Lecture 10: Cyclic Voltammetry

CRITERIA TO GET A CERTIFICATE

Average assignment score = 60 %.

Final exam score = 60 %

Final score = Average of assignment score + Exam score

Registration:

Please find below the link for online registration

 <https://forms.gle/2Ny3pEFs3PqHyiZH9>



Last date of registration: 02/09/2022