SHIVAJI COLLEGE

UNIVERSITY OF DELHI

NAAC ACCREDITED 'A' GRADE

Add-on Course

on

"GUIDE OF MATERIALS CHARACTERIZATION TECHNIQUES"

(Hybrid Mode)

21 August - 27 September, 2025

Organized by:

Department of Physics

Who can attend?

This course is open for students of all courses of Shivaji College. 20% of seats are open for students of other colleges/institute.

ABOUT COLLEGE

Shivaji College is a premier institution in West Delhi, accredited with grade 'A' by NAAC. Shivaji College witnessed a remarkable rise in the **NIRF rankings from 70th to 49th in 2024**. The college has also earned a prestigious position in the ***India Today All India Rankings 2025, securing **23rd rank in Commerce, 32nd in Science, and 36th in Humanities*** across India. Among Delhi colleges, the institution ranks ***14th in Commerce, 15th in Science, and 16th in Humanities***, reflecting its growing academic reputation. It was established in 1961 by Hon'ble Dr Panjabrao Deshmukh, Union Minister for Agriculture and a renowned social activist and farmer-leader. The college offers twenty undergraduate courses in Science, Commerce and Humanities, a self-financing course in Bachelors in Business Economics, three post-graduate courses. Several senior faculty members supervise Ph.D. scholars registered with University of Delhi, while some engage in UGC-sponsored major and minor research projects. Some students of the college frequently emerge as rank-holders in the University examinations and many are placed for internships in prestigious organizations annually.

ABOUT DEPARTMENT

The Department of Physics at our institution is characterized by an inspiring faculty, creative students, and accomplished alumni. We firmly believe that while desire serves as the key to motivation, it is determination and unwavering commitment to excellence that lead to success. Our faculty are dedicated to achieving excellence in both teaching and research. The primary goal of the department is to deliver high-quality education in physics.

PATRON

Prof. Virender Bhardwaj
Principal
Shivaji College

CONVENOR (ADD ON COURSE)

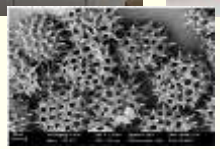
Dr. Richa Arora
Assistant Professor
Department of Chemistry

COURSE CONVENOR

Dr. Neeru Sharma
Assistant Professor
Department of physics

COURSE COORDINATOR

Dr. Shobha,
Mr. Parath. K. Kasana,
Dr. L.Thansanga
Assistant Professor
Department of Physics



Note: Students are advised to keep their laptop/ Phone and a notebook during the lectures

COURSE OBJECTIVE

❖This course is designed to provide students with a comprehensive understanding of the principles, methodologies, and applications of various characterization techniques used in materials science and engineering.

❖The course covers chemical analysis and surface analysis techniques as well as microscopy and diffraction techniques

WHY THIS COURSE

•Keeping in view the needs of future research and development challenges, efficient and robust characterization techniques are the need of the modern world. Academic and professional researchers need several characterization techniques for material analysis to confirm their practical work.

•Microscopy and spectroscopy are used for the characterization of a wide range of materials. The microstructure analysis is performed using microscopy (SEM) and (TEM).

•For chemical composition analysis different spectroscopy techniques are generally employed e.g., NMR, Raman, FTIR, XRD, XRF and SEM(EDS).

•Mastering these techniques allows for better material selection, optimized production, and the development of new materials with specific desired properties.

COURSE CONTENT

Unit 1: Introduction

Introduction about Solid/Materials, their Properties, Techniques and types,

Unit 2: Structure analysis Tool:

X-ray diffraction, Phase identification, indexing and lattice parameter determination.

Unit 3: Microscopy techniques:

Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Scanning Probe Microscopy (SPM), Transmission Electron Microscopy (TEM).

Unit 4: Thermal analysis and Electrical techniques:

Thermo-gravimetric analysis (TGA), Differential thermal analysis (DTA), Electrical resistivity in bulk and thin films, Hall effect.

Unit 5: Optical characterization Techniques:

UV-VIS spectroscopy, Fourier transform infrared spectroscopy (FT-IR), Raman spectroscopy, PL, X-ray photoelectron spectroscopy (XPS).

POINTS TO REMEMBER

- The participants must fill the registration form to enroll in the course.
- Limited seats are available on first-come first-served basis.
- Certificates will be issued to students who complete the course successfully based on their assessment and attendance.
- Classes will be held in hybrid mode only.

LINK FOR REGISTRATION

NO REGISTRATION FEE

Click here for the Registration

https://shorturl.at/CIlU6

Last date of Registration:

19th August 2025

Contact Details:

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