Add on course on

Advanced Skill Enhancement in Chemistry

30 hours of classes from 15th May to 11th June, 2025 in Online Mode

Organized by Department of Chemistry
In collaboration with IQAC

Abhedananda Mahavidyalaya, Sainthia

Approved by UGC, Affiliated to The University of Burdwan
and accredited by NAAC

Academic Year 2024-25

B.Sc. Chemistry (Hons.)/ 3 year degree/4-year honours in Chemistry can enrol in the course by filling the following google form link
https://docs.google.com/forms/d/11_aoCLUQ5Fk7N9Ik2r6rACm3livQ7TpaFeXAUywLaj4/edit

Contact us:
Mobile No: 8207018763 (Dr. Gopal Chandra Maity), 9733819277 (Dr. Tanmay Das),
Email: tanmaydassainthia@gmail.com

Visit our website:
https://abhedanandamahavidyalaya.ac.in/

Course Objective

The objective of this add-on course is to bridge the gap between undergraduate chemistry education and advanced academic, industrial, and research-oriented opportunities. By integrating theoretical insights with hands-on skill development in analytical techniques, computational tools, data analysis, green chemistry, and intellectual property rights, the course aims to:

- Prepare students for competitive examinations such as **NET**, **GATE**, **CUET**, etc.
- Encourage students to pursue **higher education and research** after M.Sc.
- Make students aware of **industrial chemistry related career opportunities**.
- Enhance proficiency in **modern software** and **instrumentation tools** relevant to academia and industry.
- Develop critical skills in **scientific writing**, **data interpretation**, and **innovation protection** through intellectual property rights.
- Foster an awareness of **sustainability**, **industrial practices**, and the evolving **role of chemistry** in real-world applications.

This program strives to shape well-informed, research-oriented, and industry-ready chemistry graduates with a strong foundation for future success.

Course Outcome

Upon successful completion of this add-on course, students will be able to:

- **Apply analytical techniques** (such as UV-Vis, IR, NMR, HPLC, GC, and AAS) in academic and industrial contexts, particularly in quality control, environmental monitoring, and pharmaceutical analysis.
- **Demonstrate a clear understanding of green chemistry principles** and sustainability practices, with the ability to suggest eco-friendly synthetic alternatives and waste minimization strategies.
- **Use basic computational chemistry tools** (ChemDraw, Gaussian, Avogadro) for molecular modeling, structure prediction, and drug design-related tasks.
- **Understand and explain industrial chemistry concepts**, including scale-up processes, reaction engineering, and safety considerations in chemical plants.
- **Perform fundamental data analysis** using Excel, Fortran, or etc, with the ability to interpret and visualize experimental data effectively.
- **Understand the importance and process of Intellectual Property Rights (IPR)** in the field of chemical sciences.
- **Compose scientific manuscripts and research articles**, gaining exposure to journal writing techniques and publication ethics.

This course will empower students with both **academic depth** and **practical skills**, preparing them for future roles in higher education, research, and the chemical industry.

Course Overview

Exam Readiness

Equips students for NET, GATE, and CUET exams.

Research Focus

Fosters research interest post-M.Sc.

Skill Enhancement

Software training, journal writing, and IPR awareness.

Industrial Chemistry aspect

Exploring Industrial chemistry and career opportunities

Total duration: 30 hours.

Chemistry in Industry

Scale-up

Reaction Engineering

Industrial Hazards

- Role of chemistry in power industry
- Pharmaceutical & Healthcare Industry
- Role of chemistry in oil industry
- Chemical Manufacturing Industry
- Paints, Dyes & Pigments
- career opportunities

By: Mr. S. K. Bajpai, Senior Manager, NTPC Ltd., Dr. Sanjib Ghosh, Senior Lab Officer, Indian Oil Corp. Ltd., and Dr. Tanmay Das (5 Hours 30 minutes)

Analytical Chemistry Applications

Techniques to be Covered

🔬 Spectroscopic Techniques

1.UV-Visible Spectroscopy
2.Infrared (IR) Spectroscopy
3.Nuclear Magnetic Resonance (NMR) Spectroscopy
4. Mass Spectrometry (MS)
5. Atomic Absorption Spectroscopy (AAS)
6. X-ray Diffraction (XRD)

🧫 Chromatographic Techniques

1.High Performance Liquid Chromatography (HPLC)
2. Gas Chromatography (GC)
3. Thin Layer Chromatography (TLC)
4. Ion Chromatography

⚗️ Thermal & Surface Techniques

1.Thermogravimetric Analysis (TGA)
2.Differential Scanning Calorimetry (DSC)
3.Scanning Electron Microscopy (SEM) & Energy Dispersive X-ray (EDX)

🧪 Electrochemical Techniques

1.Potentiometry
2.Cyclic Voltammetry

📊 Other Techniques

1.Karl Fischer Titration

By Dr. Tanmay Mathur, Mr. Basudev Das, and Mr. Abu Raihan (4 Hours)

Green Chemistry & Sustainability

Eco-Friendly Synthesis

Design chemical processes that minimize environmental impact.

Waste Minimization

Reduce the generation of hazardous waste.

Green Solvents

Use safer, environmentally benign solvents.

By: Dr. Gopal Chandra Maity (4 Hours)

Computational Chemistry & Molecular Modeling

1. **Software Tools**
   Gaussian
2. **Software Tools**
   ChemDraw
3. **Software Tools**
   Avogadro

By: Dr. Tanmay Das (4 Hours)

Data Analysis for Chemists

Excel

PPT

Python

By: Dr. Debi Roy (4 Hours)

Intellectual Property Rights (IPR)

1 Patents

2 Copyrights

By: Dr. Mrittika Mohar (4 Hours)

Journal Writing Techniques

- Master effective journal writing.
- Improve scientific communication.

Dr. Tanmay Das &
Dr. Satyapriya Bhandari (4 Hours)

Final Quiz & Valedictory

- Assess knowledge gained.
- Celebrate achievements.

11th June 5 p.m.

Enroll Today!

This add-on course is your gateway.

Explore and shape your future in Chemical Sciences.

Enroll, Learn, Excel, and Lead!