

Department of Geology
St. Xavier's College, Ranchi

Add-on Certificate Course: Fundamentals of water quality assessment

Context:

Clean fresh water is one of the most vital natural resources and is an essential prerequisite for human health, socio-economic development, and environmental sustainability. Both surface water (rivers, lakes, reservoirs) and sub-surface water (groundwater from aquifers, springs, wells) constitute major sources of water supply.

Since the quality and quantity of water in both surface and sub-surface systems is highly dynamic and susceptible to temporal changes due to natural processes and anthropogenic activities (e.g., agricultural runoff, industrial effluents, urban wastewater), continuous and systematic monitoring and assessment of these resources becomes critically important.

Surface water is prone to contamination from point and non-point sources, while groundwater quality is often influenced by geological formations, mineral dissolution, and percolation of contaminants. Understanding both is key to effective water resource management and pollution control.

Water quality assessment provides baseline data essential for evaluating water safety, managing pollution risks, and implementing purification strategies. It involves qualitative and quantitative analysis of key physical, chemical, and biological parameters (such as pH, dissolved oxygen, heavy metals, nitrates, and microbial content), ensuring that water from various sources remains fit for consumption and ecological functions.

This course on Water Quality Assessment is an effort to equip students with a strong theoretical foundation and practical skills needed to engage in modern water testing practices. It aims to train participants in field sampling techniques, laboratory analytical methods, and data interpretation tools applicable to both surface and sub-surface water systems, ultimately contributing to sustainable water management.

Objective:

- Equip students with essential skills in water quality monitoring and quantitative analysis of critical water parameters.
 - Provide a comprehensive understanding of the principles and techniques involved in water sampling, testing, and purification.
 - Develop competency in analysing water quality data for accurate assessment and reporting.
 - Foster awareness of water quality management practices, including national and international standards.
 - Introduce students to key concepts in pollution control and sustainable development.
 - Prepare learners to apply best practices in maintaining and improving water quality across various environmental and industrial contexts.
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Target Group:

- UG/PG students of Geology, Applied Geology, Earth Sciences, and Environmental Science.
 - Research scholars working in the field of hydrogeology / geology
 - Limited to **30 participants** on a first-come, first-served basis.
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Course Duration:

- **30 hours** (including lectures, demonstrations, hands-on sessions, projects and assessments)
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Course Content:**Module I: Fundamentals of Water Quality, Water Pollution, Treatment and Management**
(8 hours)

Water resources in India, Water Quality - Fundamental concepts in chemistry, Water quality parameters and drinking water standards - Physical, Chemical and Biological parameters of drinking water. Drinking Water Standards: Primary and secondary.

Water Pollution and Management- Environmental pollution – Definition, Types - Water pollution Causes - Industrial and domestic effluents - Pesticides - Health hazards-Waterborne diseases etc.

Arsenic and fluoride contamination of groundwater, sources, impact and its mitigation strategies: Indian context and with special reference to Jharkhand.

Environmental laws and acts related to water pollution in India.

Water Purification and Treatment processes- Sedimentation, Coagulation and Flocculation, Filtration, Disinfection and other miscellaneous purification processes.

Module II: Water Analysis
(15 hours)

Sampling procedures, Determination of pH and conductivity, Test for acidity and alkalinity, Test for total hardness, Test for chemical constituents: chloride, calcium, iron etc., calculation of magnesium content. Minerals – TDS, Biochemical (or Biological) Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved oxygen (DO).

Module III: Project
(7 hours)

Quantitative and qualitative assessment of various parameters of water samples collected from various localities to be chosen by the candidate.

Certification:

- A certificate of completion will be issued to participants who attend at least 80% of the sessions and complete the final assessment.

Course Fee:

- **Rs. 2000/-** per participant (Non-refundable)

Pedagogy and Methodology:

The course will follow a blended learning approach combining theoretical instruction with hands-on practical experience to ensure comprehensive understanding and skill development. The methodology will include:

Interactive Lectures:

Conceptual understanding through instructor-led sessions using visuals, case studies, and multimedia presentations.

Laboratory Practicals:

Hands-on training in sampling methods and quantitative analysis of water quality parameters such as pH, turbidity, TDS, hardness, BOD, COD, and heavy metals.

Field Visits (if feasible):

Exposure to real-world water sources and treatment facilities for on-site data collection and observation.

Demonstrations:

Live demonstration of water quality testing kits and instruments.

Assignments and Project Work:

Short reports and a final project on water quality analysis of a selected water body to integrate theoretical and practical knowledge.

Assessment Methods:

Continuous assessment through quizzes, lab reports, and a final evaluation based on practical performance and project submission.

How to Apply:

- Interested candidates must fill out the **online registration form** (link to be provided).
- Pay the course fee via UPI/Bank transfer (details to be shared in the registration form).
- Confirmation email with schedule and instructions will be sent upon successful registration.

Contact Details:

Department of Geology, St. Xavier's College, Ranchi