Advanced Wastewater Treatment and Operations Management Training Course



23 - 27 Nov 2026

Cape town

4600 € (Per Person)

Ref: #ENV1203_275075

Course Introduction / Overview:

This comprehensive training course provides an in-depth exploration of advanced wastewater treatment principles, operational strategies, and effective management practices. In an era of increasing water scarcity and stringent environmental regulations, the ability to operate treatment facilities at peak efficiency is paramount. This program is designed to move beyond conventional methods, focusing on cutting-edge technologies and integrated management systems that ensure both compliance and sustainability. Participants will delve into complex topics such as biological nutrient removal, membrane bioreactors, and advanced oxidation processes. The curriculum is informed by foundational texts in the field, such as "Wastewater Engineering: Treatment and Resource Recovery" by the renowned authors Metcalf & Eddy, ensuring a robust and academically sound learning experience. BIG BEN Training Center has developed this course to empower professionals with the skills to tackle modern wastewater challenges, from process optimization and resource recovery to asset management and safety protocols. This is not just a technical course; it is a strategic program for leaders aiming to drive efficiency, innovation, and environmental stewardship within their organizations.

Target Audience / This training course is suitable for:

- Wastewater Treatment Plant Operators and Superintendents.
- Environmental Engineers and Scientists.
- Utility Managers and Directors.
- Process and Chemical Engineers.
- Regulatory Compliance Officers.
- Public Works and Municipal Engineers.
- Industrial Plant Managers responsible for effluent treatment.
- Maintenance and Operations Technicians.
- Environmental Health and Safety (EHS) Professionals.
- Consultants in the water and environmental sectors.

Target Sectors and Industries:

- Municipal Water and Wastewater Utilities.
- Industrial Manufacturing and Processing.
- Oil and Gas Exploration and Refining.
- Food and Beverage Production.
- Pharmaceutical and Chemical Manufacturing.
- Pulp and Paper Industry.
- Power Generation Plants.
- Mining and Mineral Processing.
- Governmental environmental protection and regulatory agencies.
- Engineering and Environmental Consulting Firms.

Target Organizations Departments:

- Operations and Maintenance.
- Environmental, Health, and Safety (EHS).
- Engineering and Technical Services.
- Regulatory Affairs and Compliance.
- Utilities Management.
- Plant and Facility Management.
- Quality Control and Assurance.
- Research and Development.
- Sustainability and Corporate Social Responsibility.

Course Offerings:

By the end of this course, the participants will have able to:

- Analyze the principles of advanced biological and chemical wastewater treatment processes.
- Optimize the performance of activated sludge and nutrient removal systems.
- Evaluate the application of membrane technologies like MBR and reverse osmosis.
- Develop effective strategies for sludge and biosolids management, including resource recovery.
- Implement robust process control and automation using SCADA and data analytics.
- Ensure consistent compliance with local and international environmental regulations.
- Formulate comprehensive asset management and preventative maintenance plans.
- Enhance plant safety protocols and develop emergency response procedures.
- Assess and improve energy efficiency across wastewater treatment operations.
- Integrate principles of the circular economy for sustainable water management.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive, engaging, and practical, ensuring that participants can immediately apply their learning in a real-world context. We move beyond traditional lectures by incorporating a dynamic blend of expert-led presentations, in-depth case study analyses of successful treatment plant operations, and collaborative group discussions. Participants will engage in hands-on workshops and simulation exercises that challenge them to solve complex operational problems and optimize treatment processes. Team-based activities are central to our approach, fostering peer-to-peer learning and allowing for the exchange of diverse experiences and innovative solutions. Our experienced instructors facilitate a supportive learning environment where continuous feedback is provided to guide participant development. The course emphasizes a problem-solving approach, equipping attendees not just with theoretical knowledge but with the critical thinking and practical skills necessary to manage modern wastewater treatment facilities effectively and efficiently.

Course Agenda (Course Units):

Unit One: Fundamentals of Wastewater Treatment and Characterization

- Introduction to wastewater characteristics and contaminants.
- Review of preliminary, primary, and secondary treatment stages.
- Principles of microbiology and biochemistry in wastewater treatment.
- Wastewater sampling techniques and laboratory analysis protocols.
- Understanding key performance indicators (KPIs) for treatment plants.
- Regulatory frameworks and effluent discharge standards.
- Health and safety considerations in wastewater environments.

Unit Two: Advanced Biological Treatment Processes

- Deep dive into the activated sludge process and its variations.
- Biological Nutrient Removal (BNR) for nitrogen and phosphorus.
- Design and operational principles of Membrane Bioreactors (MBRs).
- Troubleshooting common operational issues in biological systems.
- Process modeling and simulation for performance optimization.
- Control of bulking and foaming in activated sludge systems.
- Anaerobic treatment processes and biogas production.

Unit Three: Tertiary and Physicochemical Treatment Technologies

- Advanced Oxidation Processes (AOPs) for recalcitrant compounds.
- Disinfection technologies: chlorination, UV, and ozonation.
- Membrane filtration processes: microfiltration, ultrafiltration, and reverse osmosis.
- Coagulation, flocculation, and sedimentation optimization.
- Adsorption processes using activated carbon.
- Technologies for water reuse and reclamation.
- Managing disinfection byproducts (DBPs).

Unit Four: Sludge and Biosolids Management

- Sludge characterization and quantification.
- Thickening and dewatering processes (centrifuges, belt presses).
- Anaerobic and aerobic digestion for stabilization.
- Resource recovery from sludge: nutrient and energy recovery.
- Biosolids disposal, reuse, and regulatory compliance.
- Odor assessment and control strategies in solids handling.
- Innovations in thermal hydrolysis and sludge reduction.

Unit Five: Plant Operations, Management, and Future Trends

- Process control, instrumentation, and SCADA systems.
- Developing effective asset management and maintenance strategies.
- Energy efficiency audits and optimization in treatment plants.
- Emergency preparedness and response planning.
- Data management and analytics for operational decision-making.
- The role of digitalization and smart water technologies.
- Future outlook: circular economy, resource recovery, and sustainable management.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

As we push the boundaries of water reclamation toward direct potable reuse, how do we effectively balance the public's perception of risk with the scientific assurances of advanced treatment technologies?

What unique qualities does this course offer compared to other courses?

This training course distinguishes itself by offering a holistic and forward-looking perspective on wastewater management, moving beyond standard operational training. While other courses may focus narrowly on specific technical processes, this program integrates advanced operational techniques with strategic management principles, including asset management, energy optimization, and regulatory strategy. A key differentiator is our emphasis on the future of the industry, with dedicated modules on resource recovery, the circular economy, and the implementation of smart water technologies. The curriculum is built upon a foundation of practical application, utilizing real-world case studies and problem-solving workshops rather than purely theoretical instruction. This approach ensures that participants learn not just the "how" but also the "why" behind advanced treatment strategies, empowering them to make informed, data-driven decisions. The course fosters a deep understanding of the entire water cycle, preparing professionals not just to operate a plant, but to lead it towards a more sustainable and efficient future.