

COURSE TITLE: SEWERAGE AND DRAINAGE SYSTEMS

COURSE DESCRIPTION

Sewerage and drainage systems are essential urban infrastructure designed to safely collect, convey, and manage wastewater and stormwater. Efficient wastewater management relies on precise hydraulic profiling, robust structural integrity, and proactive maintenance to prevent surcharging and environmental contamination. This unified course equips utility professionals with specialized expertise in designing resilient sewer networks using advanced software (SewerCAD). It covers comprehensive operation and maintenance (O&M) protocols, the mitigation of catastrophic crown failures, and strict occupational safety practices. By integrating theoretical hydraulics with practical field diagnostics and trenchless rehabilitation technologies, this program empowers utilities to maintain self-cleansing, durable, and safe wastewater systems.

About This Course

Below are the trainings aligned with this course category, along with their respective modules. These have been designed to systematically address the outlined objectives and enhance participant capacity.

<i>Training 1</i>	<i>Designing Efficient Sewer Systems: Mastering SewerCAD and Hydraulic Profiling for Optimal Wastewater Network Solutions.</i>
Module 1: Gravity Flow Hydraulics & SewerCAD Interface (Manning's equation, sanitary load allocation, digital network representation, nodes/conduits/invert elevations). Module 2: Hydraulic Profiling & Surcharging Mitigation (Slope/velocity/depth analysis, hydraulic profile generation, pipe diameter optimization, peak wet weather simulations).	
Objectives <ul style="list-style-type: none">• Design and simulate gravity flow wastewater networks using automated hydraulic profiling software like SewerCAD.• Optimize manhole positioning, pipe slopes, and invert elevations to ensure self-cleansing velocities and reduce maintenance costs.	
<i>Training 2</i>	<i>O&M of Water Supply and Sewerage Systems: Challenges and Solutions</i>
Module 1: O&M for Gravity-Flow Sewers (Maintenance scheduling, sewer de-silting, managing sewer blockages, corrosion control, and surcharging mitigation). Module 2: Disposal Station & Lift Pump Operations (O&M of wastewater lift and disposal stations, pump efficiency monitoring for heavy solids, emergency response, and handling real-time flow challenges).	
Objectives <ul style="list-style-type: none">• Implement preventive operation and maintenance (O&M) protocols to resolve sewer blockages, surcharging, and structural corrosion.• Optimize the performance of disposal stations and lift pumps to efficiently manage peak wet weather flows.	
<i>Training 3</i>	<i>Understanding and Preventing Crown Failures: Strategies and Solutions</i>
Module 1: Biochemical Mechanisms & Structural Inspection (H ₂ S generation in anaerobic conditions, early degradation indicators, confined space protocols, CCTV pipeline inspection, and structural vulnerability assessments).	

Module 2: Rehabilitation Technologies & Proactive Odor Control (Trenchless methods, CIPP lining, epoxy coatings, acid-resistant materials, ventilation design, chemical dosing strategies).

Objectives

- Identify the biochemical mechanisms of hydrogen sulfide (H₂S) generation and diagnose early indicators of concrete crown corrosion.
- Execute structural vulnerability assessments using CCTV pipeline inspection and condition grading in confined spaces.
- Select and apply modern trenchless rehabilitation methods, including CIPP lining and epoxy coatings, to extend asset lifespans.

Training 4

Safeguarding WATSAN Professionals & Staff: Managing Occupational Health and Safety Risks, Hazards, and Best Practices

Module 1: Confined Space Entry & Biological Hazards (Identifying extreme physical, chemical, and biological risks, strict confined space entry protocols, full-body harnesses, and continuous multi-gas/H₂S detection).

Module 2: Decontamination & Toxic Emergency Response (Emergency rescue from confined spaces, basic life support for hazardous gas exposure, strict site decontamination procedures, and mandatory respiratory protection).

Objectives

- Identify confined space hazards and enforce strict Personal Protective Equipment (PPE) mandates to cultivate a proactive occupational safety culture.
- Standardize emergency response, first aid, and site decontamination protocols to protect field operators during high-risk sanitation operations.

Provisions

The following details outline the delivery format, practical tools, and safety equipment provided to support participants throughout this hands-on training module.

Operational Aspect	Details
Mode of Delivery	Face-to-Face, Hands-on Computer Lab, Field Demonstrations, and Practical Sessions.
Language	English & Urdu.
Teaching Methods	Presentations in addition with activities, group discussions, hands-on software lab exercises, hydraulic profiling drills, hands-on gas detection drills, CCTV footage analysis, and team design challenges.
Tools & Equipment	Desktop Computers/Laptops, Projector & Screen, Ultrasonic Flow Meters, Velocity Meters, Pressure Gauges, Portable Gas Monitors (GX-2009), Sewer Camera (Kantool Ltd), Manhole Cover Locators, Air Blowers, Pipe Plugs, Sludge Measuring Rods, CPR Dummy, Patient Stretcher, Water Network Model, and Demonstration Fittings (Ball Valves, Unions, Elbows, Sockets). Personal Protective Equipment (PPE) Includes: Safety Helmets, Safety Shoes, Safety Goggles, Full-Body Harnesses, Rain Boots, Heavy-Duty Safety Gloves, Respirators/Face Masks, High-Visibility Vests (required for site visits, confined space simulations, and field-based exercises).
Residence Facilities	On-campus hostel facilities are available for out-of-station participants attending the training.