

Infrastructure Diploma

Course details



Description

Bentley's water, wastewater, and storm water products continue to deliver excellence in hydrologic and hydraulic system analysis and design. These products are deployed across the full plan, design, operate, and maintain lifecycle of water resource infrastructure to optimize designs, manage leaks, prioritize investments, manage energy consumption, and enhance operations workflows.

- The main objective of the water supply system is to provide adequate storage capacity to supply potable water for the buildings & commercial areas with adequate quantity and pressure, and with minimum construction and operation costs, complete with necessary provisions to meet the fluctuating demands of the site.
- The main objective of wastewater collection systems is to convey the domestic wastewater from its sources to the public sewage collection, then to a location where it may be treated and ultimately reclaimed for reuse or recycling.
- The main objective of a storm drainage system is to prevent the accumulation and retention of water on paved and parking areas.

Bentley offers a streamlined utility network design and management product with Bentley Utilities Designer. This product is a comprehensive design and GIS-based management application for electric, gas, water, and wastewater networks and can be configured to integrate with a variety of GIS and WMS systems. Bentley Utilities Designer is fully integrated with WaterGEMS, SewerGEMS and other programs like HAMMER, FlowMaster, and InfraWizard.

OBJECTIVES:

This course covers the design, management and drawing of infrastructure different networks:

- WaterGEMS (WaterCAD)
- SewerGEMS (SewerCAD)
- Using Autodesk Civil3D in WaterGEMS & SewerGEMS (Pressure profiles, Surface Intro., Alignment)
- HAMMER
- FlowMaster
- InfraWizard

Resourcing, text books and reading material:

We recommend the following books:

- | | |
|---|------------------|
| • Advanced Water Distribution Modeling and Management | Walski, Tom |
| • Computer Applications in Hydraulic Engineering, 8th Edition | Multiple Authors |
| • Floodplain Modeling Using HEC-RAS | Dyehouse, Gary |
| • Heastad Methods Water Resources Modeling Collection | |
| • Security and Emergency Management for Water Systems | Doe, Steve |
| • Storm water Conveyance Modeling and Design | Durrans, Rocky |
| • Wastewater Collection System Modeling and Design | Walski, Tom |
| • Water Loss Reduction | Multiple Authors |
| • Water Supply and Wastewater Removal | Multiple Authors |

PREREQUISITES:

- Basic knowledge and skills about using computers.
- Hydraulics background is recommended.



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Grading

Attendance 40%

Assignments 60%

To pass the course and receive both Bentley & CAD MASTERS certificate you should:

- Attend at least 80% of course hours
- Score more than 70% as a total score + Technical evaluation by the instructor

Course Outline:

This course including the following:

1. WaterGEMS

- Introduction
- Design Flows
- Collection Works
- Ground Reservoir
- Elevated Tanks
- Pumps
- Network Types
- Network Alignment Types
- Valves Types
- Surface Box & Valve Chambers
- Longitudinal Profile
- Water Network Design Using Method of Section
- Water Network Design Using Method of Circle
- Pipes Materials
- Fire Hydrant Arrangement
- Valves arrangement
- Hardy Cross method
- Introduction in WaterGEMS
- Steady State Model (with default flow input)
- EPS Model with Elevated Tank (with untraditional flow input method)
- Training Model (Steady State + Extended Period Simulation)
- How to Deal with Fire hydrants
- How to deal with control valves
- Scenarios and Alternatives
- Exporting Model to AutoCAD and finish the project
- How to present your results



2. HAMMER

- Introduction to Water HAMMER
- Hydraulic Transient Theory
- Pump Theory
- Control Valves Theory
- Friction and Minor Losses
- HAMMER Protection Devices and Techniques
- Bentley HAMMER - Run both steady state and transient analyses.
- Bentley HAMMER - Different transient scenarios
- Bentley HAMMER - Control valves modeling through a transient scenario.
- Bentley HAMMER - Pump characteristics definition
- Bentley HAMMER - Studying the power failure case of pump station through a transient scenario without protection



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- Bentley HAMMER - Studying the power failure case of pump station through a transient scenario with protection
- Bentley HAMMER - Studying the Emergency Startup of pumps after the power failure and analyze the results for different lag times between failure and startup without protection.
- Bentley HAMMER - Studying the Emergency Startup of pumps after the power failure and analyze the results for different lag times between failure and startup with protection.
- Bentley HAMMER – Surge Control Strategy
- Bentley HAMMER – Hydropneumatic Control Strategy
- Bentley HAMMER - Presenting the output results such as graphs, animations, and annexes.

3. SewerGEMS (Sewage and Storm)

- Design Flows
- Network Components
- Manholes Locations
- Different Between Combined System and Separate System
- Pipes Materials
- Manual Design
- Storm Times Definition
- Intensity Duration Frequency (IDF Curve)
- Introduction in SewerGEMS
- Complete Sewage Model with checking Profiles
- Advanced method to input flows in the network
- Complete Storm Model (Positive System) with checking Profiles
- Rainfall Rational Method with Hydraulic Model
- Rainfall SCS Method with Hydraulic Model
- Complete Surface Drainage Model
- Complete Subsurface Drainage Model
- Extra Training Models and Questions
- How to present your results
- How to export model to CAD
- How to Use InfraWizard to make profiles



4. FlowMaster

- Analyzing a trapezoidal channel
- Analyzing an irregular channel
- Analyzing inlets and gutters

5. InfraWizard

- 2D Clash Detection
- Gravity profiles Production



6. Civil 3D

- How to create a Surface
- How to create an Alignment
- How to create Profiles
- How to use the Pressurized Networks (Plans, Profiles, Catalogues, etc)
- How to use the Pipe Networks (Plans, Profiles, Catalogues, etc)



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7. Navisworks

- 3D Clash Detection



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