Water Distribution Level 3 & 4

Course Outline

Course Description

This 4.5 day (30 hour) course is designed to prepare the participants to write their Environmental Operators Certification Program (EOCP) exam for Water Distribution Level 3 or 4 (required by Yukon Government Regulation).

The course provides the knowledge and understanding required to construct, repair and maintain water distribution systems at an intermediate to advanced level. Participants will evaluate operational processes and associated equipment, become knowledgeable in system design criteria and hydraulic concepts and perform advanced practical calculations

Course Pre-requisites

There are no specific pre-requisites for this course. However, Grade 12 (or equivalent) math skills are an asset. Math upgrades are available –contact us.

Continuing Education Units (CEUs)

This course is accepted with EOCP as core for Water Distribution and Small Water Systems, and as related for Water Treatment, Wastewater Collection, Wastewater Treatment, and Small Wastewater Systems; 3.0 CEUs can be obtained from this course.

Course Duration

- 5 days
- 8:00 am to 4:00 pm each day (except on the last day from 8:00 am to 12:00 pm)
- 1 hour lunch break
- morning and afternoon break (15 minutes each)

Course Topics and Learning Outcomes

Upon successful completion of the course, the students will be able to:

1: Introduction, Water Regulations

- Gain a thorough understanding of the local, provincial and federal governments' regulatory legislation and requirements governing the supply and distribution of good quality, safe drinking water.
- Comprehend, analyze and apply best practices applicable to:
    - Maintaining Regulatory Compliance
    - Drinking Water Protection Act and Regulations
    - Ground Water Protection Regulations
    - Guidelines for Canadian Drinking Water Quality

2: Water Quality

- Scientifically define and categorize water quality
- Identify and understand indicator organisms
- Carry out various coliform testing and other testing procedures
- Comprehend properties of water affecting quality
- Identify biological, chemical (inorganic and organic) and radiological contaminants and their associated health risks
- Identify physical parameters
- Apply remedies and treatment technologies to enhance water quality
- Manage and effectively respond to water quality customer inquiries

3: Operator Mathematics and Practical Calculations (Assignment 1)

- Review standard units of measure and conversions
- Calculate percentages and apply to chemical concentrations
- Determine areas and volumes of various water appurtenances
- Use algebraic formulae to determine:
    - velocities
    - flow rates
    - detention/discharge time
    - chemical concentration and dosages
    - input/output power draws and pump efficiency rates
- Apply Ohms Law to calculate electrical currents and power consumption
- Perform horsepower and pump efficiency calculations
- Apply pump affinity laws to determine changes in pump performance.
- Determine operating costs and perform budgetary calculations

4: Water Use and System Design

- Analyze water sources and their effect on system design
- Identify different types of water system layout and related advantages
- Perform water main sizing design exercise
- Perform head loss analysis of the many accessories (i.e. valves and fittings) used in piping networks

5: Hydraulics

- Analyze fluids at rest and in motion
- Develop hydraulic gradients
    - Perform pressure calculations and head losses based on gradients
    - Illustrate conditions impacting hydraulic transients
- Apply surge control practices.

6: Instrumentation and Controls (Assignment 2)

- Recognize secondary instrumentation and telemetry control systems
- Define analog and digital systems
- Define control classifications
- Operate and maintain control sensors, transmitters, receivers and indicators
- Demonstrate a keen understanding of supervisory control and data acquisition systems

7: Motors and Pumps

- Analyze electrical systems
- Identify and determine benefits of different types of motors
- Define types of motor protection equipment
- Determine pumping efficiency improvement
    - Reduce power usage and peak demand charges
    - Power factor improvements
- Perform regular motor maintenance
- Apply electrical safety procedures when working with motors.

8: Meters

- Review meter types and their applications
- Develop a thorough understanding of proper installation techniques
- Define different meter reading technologies
- Determine detailed testing procedures
- Perform regular maintenance and repair

9: Operational Practices

- Determine benefits and identify best practices and of maintaining water quality
- Develop a thorough understanding of Storage facility operation
- Plan and perform directional flushing programs
- Plan and perform pipeline cleaning
- Plan and perform air purging and pigging
- Understand concepts and methodologies of corrosion control
- Perform system pressure and flow testing
- Defining leak detection techniques and water audits

10: Water Pipelines

- Evaluate pipe rating systems
- Pipeline selection
- Identify joint types and fittings
- Properly construct mainline and service connections
- Preform new watermain pressure testing, disinfection and sampling
- Perform variety of maintenance and repair activities
- Interpret comprehensive system and design drawings

11: Operational Safety

- Understand, practice and review safe procedures in the workplace including;
    - Safety Programs
    - First Aid
    - Site Safety
    - Excavation Safety
    - Confined Space Entry
    - Traffic Control
    - Personal Protective Equipment
    - Lock-out
    - WHMIS
    - Fire Extinguishers
    - Chlorine Handling

12: Administration and Effective Supervision

- Understand and apply effective leadership skills
- Demonstrate strong organizational behavior skills
- Identify and apply sound recruitment techniques
- Plan and implement operations, wellness and safety programs
- Promote team building
- Communicate effectively
- Manage public relations
- Coordinate mobile equipment and facilities

13: Exam Tips and Sample Questions

- Practice techniques for writing multiple-choice exams
- Answer sample multiple-choice questions

Delivery Method/Format

Instructional Method	Percentage of Class Time
Hands-on/Q & A	20%
Examples/Case Study	20%
Presentation/Lecture	15%
Slides	35%
Demonstration	0%
Video/DVD	5%
Tutoring	5%

Material/Handouts (supplied)

- Student Binder: Dragonetti, D., 2018. Water Distribution Level 3 & 4 EOCP Certification Exam Prep. Vancouver, BC.
- Reference Manual: AWWA, Water System Operations (WSO), Water Distribution Grades 3 & 4.
- EOCP Course Completion and Evaluation Form.
  - every student needs to complete and return this form for any CEU allocation
- Calculators are provided but students are welcome to use their own.
  - please return

Course Requirements

Attendance and participation in class are required. It is the student's responsibility to attend all classes.

CEUs will be allocated based on attendance and course completion; Yukon University records will show a pass or fail result. If the participant doesn't attend the class, Yukon University records will show a "no show" result and no CEUs will be allocated.

Evaluation

There will be a quantifiable evaluation at the end of this course with a passing mark of 70%. If anyone fails this evaluation, arrangements can be made for a re-assessment. Please note that this evaluation is for self-assessment purpose only.

The final evaluation for this course is NOT an EOCP certification exam. To challenge a certification exam, register separately with EOCP at least 3 weeks in advance: 1-866-552-3627 or crm.eocp.ca.

Appropriate Language

In all areas of the university environment, students are responsible for showing respect for others. Swearing, or language that is discriminatory or derogatory in relation to race, sex, ethnic background, religious beliefs, age, and physical condition is not appropriate.

Electronic Devices

In order to be successful in classes and minimize distractions for others, cell phones, iPods, and other electronic devices must be turned off while students are in class. In an emergency situation, the instructor may give a student permission to use a cell phone or pager.

Academic and Student Conduct

Information on academic standing and student rights and responsibilities can be found in the current Academic Regulations that are posted on the Student Services/Admissions & Registrations web page.

Plagiarism

Plagiarism is a serious academic offence. Plagiarism occurs when students present the words of someone else as their own. Plagiarism can be the deliberate use of a whole piece of another person's writing, but more frequently it occurs when students fail to acknowledge and document sources from which they have taken material. Whenever the words, research or ideas of others are directly quoted or paraphrased, they must be documented according to an accepted manuscript style (e.g., APA, CSE, MLA, etc.).

Resubmitting a paper which has previously received credit is also considered plagiarism. Students who plagiarize material for assignments will receive a mark of zero (F) on the assignment and may fail the course. Plagiarism may also result in dismissal from a program of study or the University.

Academic Accommodation

Reasonable accommodations are available for **all** students, including Community Campuses (Zoom meeting option for community campus students). Yukon University is committed to creating an accessible learning environment open to all students by ensuring equal access to academic facilities, learning environments and educations programs.
We know every student is unique and has different needs. Accessibility Services works collaboratively with students with disabilities to provide a supportive learning environment that enhances academic and personal development.
Students are responsible for self-identifying and requestions academic accommodations from Accessibility Services each new semester. All services are confidential.
Contact Accessibility Services at (867) 668-8780 or access@yukonu.ca.

Class Outline

Agenda	Time (hours)
Introduction	0.50
Water Regulations	1.50
Water Quality	1.50
Operator Mathematics and Practical Calcs	5.00
Review Assignment 1 (math)	0.50
Water Use and System Design	1.50
Hydraulics	2.00
Instrumentation and Controls	1.00
Review Assignment 2	0.50
Motors and Pumping	2.00
Meters	1.00
Operational Practices	2.00
Water Mains: Ratings, Selection, Construction and Repair	2.00
Plan Reading	1.00
Operational Safety	2.00
Administration	1.00
Effective Leadership and Supervision	2.00
Review Assignment 3	0.50
Exam tips and Sample Questions	0.50
Final Exam	2.00