

# **Wastewater Collection Level 3 & 4**

## **Course Outline**

### **Course Description**

This 4.5 day course is designed to prepare the participants to write their Environmental Operators Certification Program (EOCP) exam for Wastewater Collection Level 3 or 4.

The course provides the knowledge and understanding required to construct, repair and maintain wastewater collection systems at an intermediate to advanced level. Participants will evaluate operational processes and associated equipment, become knowledgeable in system design criteria and engineering 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 Wastewater Collection, Small Wastewater Systems and Wastewater Treatment and as related for Water Distribution, Water Treatment and Small Water Systems.

### **Course Duration**

- 5 days
- 8:30 am to 4:00 pm each day (except last day from 8:30 am to 12:00 pm)
- 1hour 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, Wastewater History, Systems Overview**

- Describe types of wastewater collection systems and their primary purpose
- Explain the history and evolution of wastewater and runoff collection systems
- Identify various components of the collection system

### **2. Wastewater Treatment Overview**

- Define wastewater composition and sources
- Identify and describe various types of treatment processes

### **3: Wastewater Hydraulics and Bio-Chemistry**

- Identify types of collection systems including gravity, low pressurized and pumped applications
- Study velocity and flow dynamics in open gravity flow systems
- Define physical, chemical and bacterial characteristics
- Identify harmful gases, particularly hydrogen sulfide and their associated impacts on collection systems
- Review how hydrogen sulfide is generated and various control applications

### **4: Operator Mathematics and Practical Calculations**

- Understand 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

## **5: Instrumentation and Controls**

- 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

## **6: Lift Stations, 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.
- Outline lift station configurations and features
- Classify types of positive displacement and velocity pumps
- Review operation and mechanical details of centrifugal pumps
- Study pump curves

## **7. Engineering Principles**

- Identify construction aggregates characteristics and applications
- Study design periods, flows and variations
- Design new sewer pipeline
- Understand surveying principles and perform leveling survey

## **8. Pipeline Design Concepts**

- Develop cut sheets for gravity flow piping networks
- Identify construction control techniques
- Evaluate pipe rating systems
- Select pipe material
- Identify joint types and fittings

## **9: Pipeline Construction**

- Properly construct mainline, access chambers and service connections
- Perform new sewer main pressure testing,
- Interpret comprehensive system and design drawings

## **10: 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

### **11: 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

### **12: Exam Tips and Sample Questions**

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

### **Delivery Method/Format**

<b>Instructional Method</b>	<b>Percentage of Class Time</b>
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: Yukon University, Wastewater Collection Level 3 & 4 EOCP Certification Exam Prep.
- EOCP Course Completion and Evaluation Form.
  - every student must 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. 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 directly with EOCP at least 3 weeks in advance: [crm.eocp.ca](http://crm.eocp.ca) or 1-866-552-3627.**

### **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 students requiring an academic accommodation to fully participate in this class. These accommodations are available for students with a documented disability, chronic condition or any other grounds specified in section 8.0 of the Yukon University Academic Regulations (available on the Yukon University website). It is the student's responsibility to seek these accommodations. If a student requires an academic accommodation, they should contact the Learning Assistance Centre (LAC) at [LearningAssistanceCentre@yukonu.ca](mailto:LearningAssistanceCentre@yukonu.ca).

**Class Outline**

<b>Agenda</b>	<b>Time (hours)</b>
Introduction	1.00
Wastewater History and Systems Overview	1.50
Wastewater Treatment	1.50
Operator Mathematics and Practical Calcs	5.00
Review Math Assignment	0.50
Bio Chemistry	1.50
Hydraulics	2.00
Instrumentation and Controls	1.00
Lift Stations	1.00
Motors and Pumping	2.50
Engineering Principles	2.00
Pipeline Selection Design and Construction	3.00
Operational Safety	2.00
Administration	1.00
Effective Leadership and Supervision	2.00
Exam tips and Sample Questions	0.50
Final Exam	2.00