

# **Wastewater Treatment Level 1 & 2**

## **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 Treatment Level 1 or 2 (required by Yukon Government Regulation).

The main objective of the course is to safeguard the public and environment by providing knowledge to operators regarding handling and treatment of wastewater influent for the purpose of discharging to the environment.

### **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 recognized by EOCP for 3.00 CEUs (core for WWT, WWC, SWWS certifications and related for WD, WT, SWS certifications).

### **Course Duration**

- 4.5 days
- 8:30 am to 4:00 pm each day, except last day from 8:30 am to 12:00 pm
- 1 hour lunch break
- morning and afternoon break (15 minutes each)

## **Course Topics and Learning Outcomes**

### Introduction

- Housekeeping
- Instructor Introduction
- Operator Introductions
- EOCP Certification & Renewal

### Legislation and Safety

- Legislation
- Negligence, Due Diligence, Operator Certification and Education
- Recordkeeping
- ERPs
- Asset & Maintenance Management Plans
- Electrical Safety
- Lifting, Falls, and Drowning
- WHIMIS & TDG
- Personal Protective Equipment (PPE)
- Confined Space Entry
- Excavations
- Underground Hazards

### Septic Systems

- Purpose of Septic Systems and Tanks
- Viruses and Diseases
- Septic System Components
- Conventional Systems
- Septic Tank Pumping and Safety
- Septic System Maintenance
- Water Usage

### Primary Wastewater Treatment

- Sewage, Grey Water, and Black Water
- Combined Sewers
- Problems with Infiltration
- Storm Sewers
- Diseases, Bacteria, Viruses, Protozoa, and Rotifiers
- Wastewater Pretreatment
- Types of Head Works
- Primary Clarifiers and Treatment
- Grease Removal

### Wastewater Treatment Lagoons

- Types of Lagoons and Treatment

- Oxygen Transfer
- Temperature Effects on Lagoons
- Types of Surface Aeration Systems
- Nutrient Effects on Lagoons

#### Activated Sludge

- What is the Purpose and Function of Activated Sludge?
- Activated Sludge Process
- What is a Mixed Liquor?
- Return and Waste Activated Sludge
- Internal Mixed Liquor Recycle
- Extended Aeration
- How an Oxidation Ditch Functions
- How a Sequencing Batch Reactor (SBR) Functions and Their 5 Stages to Treatment

#### Biological Treatment

- How a Trickling Filter Operates
- How a Rotating Biological Contactor Operates

#### Nutrient Removal

- Biological Nutrient Removal
- Nitrification / Denitrification
- Phosphorous Removal
- Volatile Fatty Acids
- Westbank / Johannesburg WWT Process
- Secondary Clarification
- Types and Uses of Disinfection Process

#### Effluent and Solids Handling

- Uses for Wastewater Treated Effluent
- Natural Evaporation
- Groundwater Recharge
- Using Effluent for Spray Irrigation
- Other Uses for Wastewater Treated Effluent
- Discharging to Wetlands
- Handling Biosolids
- Handling Different Types of Sludge
- Sludge Thickening Processes
- Three Different Forms of Sludge Digestion
- Temperature Effects on Digestion
- The Different Stages of Anaerobic Digestion
- The Different Dewatering Methods Available
- The Purpose and Use of Dissolved Air Flotation

- What are The Purposes of Testing the Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) concentrations?
- The Importance of Dissolved Oxygen Concentrations

#### Wastewater Collection Systems

- Pressure and Vacuum Systems
- Collection System Designs
- Different Types of Pumping Facilities
- Manholes Provide Access for Operations and Maintenance

#### Math for Wastewater Operators

- Calculator Functions
- Order of Operations
- The Metric Systems and Common Units
- Dimensional Analysis
- Basic Algebra
- Ratios and Proportions
- Calculating Averages and Percentages
- Calculating Perimeters and Circumferences
- Area and Volume Calculations
- Organic Loading
- Mixed Liquor Volatile Suspended Solids
- F/M Ratios
- Sludge Volume Index
- Wastewater Hydraulic Math

#### **Material/Handouts (supplied)**

- Student Binder: Yukon University, 2017. Wastewater Treatment Level 1 & 2; a core –EOCP Exam Preparation– course. Whitehorse, Yukon
- Reference Manual: Office of Water Programs, 2008. Operation of Wastewater Treatment Plants, Volume I; a field study training program. 7th Edition. Sacramento, California.
- 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. 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**

**Monday**

30 min Introduction  
 195 min Chapter 1 – Legislation and Safety  
 60 min Lunch  
 135 min Chapter 2 – Septic Systems  
 60 min Chapter 3 – Primary Wastewater Treatment

**Tuesday**

30 min Review – Day One  
 195 min Chapter 3 – Primary Wastewater Treatment  
 60 min Lunch  
 150 min Chapter 4 – Wastewater Treatment Lagoons  
 45 min Chapter 5 – Activated Sludge

**Wednesday**

30 min Review – Day Two  
 90 min Chapter 5 – Activated Sludge  
 105 min Chapter 6 – Biological Treatment  
 60 min Lunch  
 90 min Chapter 7- Nutrient Removal  
 105 min Chapter 8 - Effluent and Solids Handling

**Thursday**

30 min Review – Day Three  
 150 min Chapter 9 – Wastewater Collection Systems  
 45 min Chapter 10 – Math for Wastewater Operators  
 60 min Lunch  
 195 min Chapter 10 – Math for Wastewater Operators

**Friday**

150 min Review – Day Four and Exam Practice  
 60 min Course Completion Exam