

Disinfection: Hypochlorites, Chlorine Gas, UV, Ozone and Chemical Handling

Course Outline

Course Description

This 4-day (26 hour) course is designed to provide operators with the skills and knowledge to safely work with the disinfectants in common use in water and wastewater systems in the Yukon.

The course will primarily focus on the requirements to safely receive, store, dispense and monitor the two disinfectants, sodium hypochlorite and chlorine gas, in most common use in the Yukon. The course will also provide an overview of the regulatory environment in the Yukon as it applies to water and wastewater treatment; the use of ultra-violet light and ozone as disinfectants; and the mathematical skills required to calculate the various dosages of chemicals used in chlorine base disinfection.

Operators who are considering writing an Environmental Operators Certification Program (EOCP) exam in the future will find that this course covers many elements that the EOCP considers to be core knowledge for operators seeking certification in the following disciplines: Small Water Systems (SWS), Water Distribution Systems (WD) and Water Treatment Systems (WT). The course will also cover topics that the EOCP considers to be related knowledge for operators of Wastewater Treatment (WWT), Small Wastewater Treatment (SWWS) and Wastewater Collection (WWC) systems.

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 1.8 CEUs (core for SWS, BWD, WT, WD, SWWS, WWT certifications, and related for WWC certifications).

Course Duration

- 4 days
- 8:00 am to 4:00 pm each day
- 60 minute lunch break
- morning and afternoon break (15 minutes each)
- student/teacher contact time 6.5 hours per day

Course Topics and Learning Outcomes

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

- understand the life processes and the physical and chemical principles that allow chlorine gas, sodium hypochlorite, ultra-violet light and ozone to inactivate or destroy pathogenic microorganisms
- apply their knowledge to safely receive, store and apply the disinfectants in use in their community
- understand and describe the function of each of the several pieces of equipment that combine to produce a functioning disinfection system
- understand the application of the appropriate mathematical formula required to calculate the appropriate dosage of a disinfectant

Delivery Method/Format

Instructional Method	Percentage of Class Time
Presentation / Lecture	60%
Hands-on lab work, Facility tour	7.5%
Video/DVD	10%
Review and unit quizzes	5%
Demonstration	10%
Final Exam	7.5%

Material/Handouts (supplied)

- Student Binder(s):
 - WO CE66 Student handbook with unit quizzes
 - WO CE66 PowerPoint slides
 - USB stick pre-loaded with reference material
- Recommended reading: White’s Handbook of Chlorination and Alternative Disinfectants – 5th Edition, Black & Veatch Corporation
Published by John Wiley & Sons, Inc.
Chlorine Institute – Pamphlets 1,63,82, 96, and 155,
(included on USB stick)
- 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. A basic four function (+ - × ÷) calculator will address all mathematical functions required to solve any equation presented in this course.
 - 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%. 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 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.

Class Outline

Topic	Duration
Day 1 Instructional Hours: 6.5	
Unit 1: Introduction	0.5
Unit 2: The Regulatory environment	2.0
Unit 3: A (Very) Brief History of Disinfection	1.5
Unit 4: Disinfection Mathematics	2.5
Day 2 Instructional Hours: 6.5	
Unit 5: Disinfection with Hypochlorites (part 1)	3
Unit 5: Disinfection with Hypochlorites (part 2)	3.5
Day 3 Instructional Hours: 6.5	
Unit 6: Disinfection with Chlorine Gas	3.5
Field trip to CGC to see Ozonation	3.0
Day 4 Instructional Hours: 6.5	
Unit 7: Alternative Disinfectants	2.0
Unit 8: Occupational Health and Safety	1.0
Unit 9: Disinfection in the field	2.0
Review, Exam	1.5