

Western University - Faculty of Engineering
Department of Civil and Environmental Engineering

CEE 3362a – Drinking Water Treatment and Quality - Course Outline 2025

In the course, students will be taught water quality and treatment principles. The course will introduce the need for proper domestic water treatment for human consumption and the problems associated with inadequate treatment. The course will also focus on drinking water treatment processes and technologies, ranging from simple, low-tech solutions to more prominent technologies in North America. Finally, the course will study identifying adequate quality and quantity of drinking water sources.

Calendar Copy:

The course will teach students the basic principles of water quality and treatment. Specific topics will include drinking water quality guidelines and legislation, identifying water sources with adequate quality and quantity, water treatment technologies, and water distribution systems. (0.5 course)

Prerequisites:

CEE 2217A/B or CBE 2220A/B

Antirequisites:

None

Note: The student is responsible for ensuring that all Prerequisite and Corequisite conditions are met or that the Faculty has granted special permission to waive these requirements. It is also the student's responsibility to ensure they have not taken a course listed as an Antirequisite. Students may be dropped from the course or not given credit for their degree if they violate the Prerequisite, Corequisite conditions.

Contact Hours:

3 lecture hours/week: Lectures will be delivered in person, and lecture slides will be posted to the course OWL site. Attending the lecture is mandatory. Lectures will be organized into learning modules, which students should review weekly. Class exercises at the end of each module will be used to track participation. Review of lecture material and self-study should take approximately 6 hours per week.

3 laboratory - tutorial hours/week:

The laboratory will be run in one or two sections depending on enrollment size. Laboratory sessions will be conducted weekly during the scheduled lab hours.

Labs require students to bring lab coat and safety glasses to each lab session.

Completion of all 6 labs is required to complete the course.

Instructor:

Caitlin Corcoran

caitlin.corcoran@uwo.ca

Office hours: in person and via Zoom (link will be posted on course OWL site)

Date and time: TBD

Textbook:

Davis, M. Water and wastewater engineering: Design principles and practice, The McGraw-Hill Companies. 2010

Other References:

Reynolds, T. and Richards, P. Unit Operations and Processes in Environmental Engineering, Cengage Learning

Droste, R.L., Theory and Practice of Water and Wastewater Treatment, J. Wiley & Sons, 2nd edition

Units:

S.I. and FPS unit systems may be used in lectures, tutorials and examinations.

Specific Learning Objectives:

The lectures and tutorial assignments will prepare students to do the following [Graduate attribute Indicator].

1. Drinking water quality [IESE 1, IESE 3]

- a) Recognize water-borne diseases and their effects on human health.
- b) Understand anthropogenic sources of drinking water contamination and the effects on human health.
- c) Identify other sources of drinking water contamination and the effects on human health.
- d) Recognize drinking water standards & legislation in North America and the rest of the world.

2. Identifying drinking water sources with adequate quality and quantity [IESE 2]

- a) Understand the hydrological cycle.
- b) Identify groundwater and surface water sources –quantity, quality, and well hydraulics.
- c) Design distribution systems to meet water demands.

3. Design drinking water treatment processes and technologies involving [PA2, D3 and D4]:

- a) Reactor flow fundamentals,
- b) Screening technologies
- c) Colloidal stability, coagulation and mixing principles
- d) Flocculation/sedimentation processes
- e) Sand filtration and other advanced processes, such as membrane filtration
- f) Chlorination and other advanced disinfection processes, such as U.V. and oxidation
- g) Adsorption

The instructor may expand or revise the material presented in the course as appropriate.

General Learning Objectives:

E=Evaluate, T=Teach, I=Introduce; (I) = Introduction, (D) = Developing, (A) = Advanced level

Knowledge Base		Engineering Tools		Impact on Society	
Problem Analysis	E	Teamwork		Ethics and Equity	
Investigation		Communication		Economics & Project Management	
Design	E	Professionalism		Life-Long Learning	

The impact of engineering on society and the environment [IESE 1,2,3] and the ability to analyze a problem and design solutions for water treatment processes [PA2, D3, D4] are evaluated at the "advanced" level.

Evaluation:

The final mark will be determined as follows:

Participation/class exercise	10%
Weekly lab reports (6)	12%
Bi-weekly assignments (4)	8%
Project	15 %
Midterm exam	15 %
Final Examination	40%
Total	100%

To complete the course, one must achieve a passing grade on the final exam.

1. Quizzes and Examinations:

A two-hour midterm exam will be held during the lecture or lab/tutorial hour (TBD).

A three-hour written final examination will be held during the regular examination period (TBD).

2. Bi-weekly Assignments:

Assignments will be given bi-weekly and must be submitted to OWL before the due date. Late assignments will be assessed a penalty of 10% per day for a maximum of 2 days, after which they will receive a zero mark.

3. Laboratories:

Labs will be conducted in person, and students must complete a laboratory report based on the collected data. Below is a tentative laboratory schedule (subject to change)

Week of	Laboratory Session
Sept 8	An introduction to lab safety and expectations (Lab intro)
Sept 16	Basic water tests: pH, alkalinity, acidity, hardness, color and turbidity (Lab 1)
Sept 22	Biological oxygen demand, total suspended solids and nitrate (Lab 2)
Sept 29	NO LAB
Oct 6	Coliform enumeration (Lab 3)
Oct 13	Coagulation and flocculation using Jar Test through turbidity and color measurement (Lab 4)
Oct 20	Sand and anthracite column (Lab 5)
Oct 27	Chlorine Demand for raw and filtered water (Lab 6), Course project introduction
Nov 3	Reading Week
Nov 10	Hands-on Course Project / Field Trip to London Drinking Water Treatment Plant (to be confirmed)
Nov 17	Hands-on Course Project
Nov 24	Hands-on Course Project
Dec 2	Hands-on Course Project
Dec 8	Course Project Presentation

Participation:

Class participation will be assessed through class exercises. Class and laboratory attendance are mandatory, and submissions related to participation should be made during lecture or lab hours.

Western University - Faculty of Engineering
2023-2024

STATEMENT ON GENDER-BASED AND SEXUAL VIOLENCE

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, here. To connect with a case manager or set up an appointment, please contact support@uwo.ca.

INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED

If, on medical or compassionate grounds, you are unable to write term tests or final examinations or complete course work by the due date, you should follow the instructions listed below. You should understand that academic relief will not be granted automatically on request. You must demonstrate to your department (or the Undergraduate Services Office) that there are compelling medical or compassionate grounds that can be documented before academic relief will be considered. Different regulations apply to term tests, final examinations and late assignments. Please read the instructions carefully.

A. GENERAL REGULATIONS & PROCEDURES

1. All first-year students will report to the Undergraduate Services Office by submitting the Academic Consideration Request Form, for all instances.
2. If you are an upper year student and you are missing a test/assignment/lab or examination you will report the absence by submitting Academic Consideration Request Form. Absences worth LESS THAN 10% of your mark, will be processed by your department office. If your course work is worth 10% OR MORE of your final grade, your request will be processed by the Undergraduate Services Office.
3. Check the course outline to see if the instructor has a policy for missed tests, examinations, late assignments or attendance.
4. Documentation must be provided as soon as possible. If no one is available in your department office or the Undergraduate Services Office, leave a message clearly stating your name & student number and reason for your call. The department telephone numbers are given at the end of these instructions.
5. If you decide to write a test or an examination you should be prepared to accept the mark you earn. Rewriting tests or examinations or having the value of a test or examination reweighted on a retroactive basis is not permitted.

B. TERM/MIDTERM TESTS

1. If you are in first year and you are unable to write a midterm/term test, contact the Undergraduate Services Office, SEB 2097 PRIOR to the scheduled date of the test.
2. If you are an upper year student and you are unable to write a midterm/term test, inform your instructor PRIOR to the scheduled date of the test and request relief through the Academic Consideration Request Form. If the instructor is not available, leave a message for him/her at the department office. If the test is worth LESS THAN 10% of your mark, your request for relief will be processed by your department office. If the test is worth MORE THAN 10% of your final grade your request for relief will be processed by the Undergraduate Services Office.
3. Be prepared to attach supporting documentation to the Department Chair and/or the Undergraduate Services Office through the online form (see next page for information on documentation).

4. Discuss with the instructor if and when the test can be rescheduled. The approval of the Chair or the Undergraduate Services Office is required when rescheduling midterm/term tests.

C. FINAL EXAMINATIONS

1. If you are unable to write a final examination, contact the Undergraduate Services Office PRIOR TO THE SCHEDULED EXAMINATION TIME to report your absence using the Academic Consideration Request Form and request permission to write a Special Final Examination. If no one is available in the Undergraduate Services Office, leave a message clearly stating your name & student number.

2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, headache, sleeping in, misreading timetable and travel arrangements.

3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department and the Associate Dean and in order to apply you must submit an "Application for a Special Exam" form. The Undergraduate Services Office will then notify the course instructor(s) and reschedule the examination on your behalf.

PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

D. LATE ASSIGNMENTS

1. Advise the instructor if you are having problems completing the assignment on time (prior to the due date of the assignment).

2. Be prepared to submit the Academic Consideration Request Form and provide documentation if requested by the instructor (see reverse side for information on documentation).

3. If you are granted an extension, establish a due date. The approval of the Chair of your Department (or the Assistant Dean, First Year Studies, if you are in first year) is not required if assignments will be completed prior to the last day of classes.

4. i) Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean, Undergraduate Studies. Documentation is mandatory. ii) A Recommendation of Incomplete Form must be filled out indicating the work to be completed and the date by which it is due. This form must be signed by the student, the instructor, the department Chair and the Associate Dean, Undergraduate Studies.

E. SHORT ABSENCES

If you miss a class due to a minor illness or other problem, check your course outlines for information regarding attendance requirements and make sure you are not missing a test, laboratory or assignment. Cover any readings and arrange to borrow notes from a classmate.

F. EXTENDED ABSENCES

If you are absent more than one week or if you get too far behind to catch up, you should consider reducing your workload by dropping one or more courses. (Note drop deadlines listed below). You are strongly encouraged to seek advice from your Academic Counsellor in the Undergraduate Services Office.

G. DOCUMENTATION

If you consulted an off-campus doctor or Student Health Services regarding your illness or personal problem, **you must provide the doctor with a Student Medical Certificate** to complete at the time of your visit and then bring it to the Department (or the Undergraduate Services Office). **This note must contain the following information:**

severity of illness, effect on academic studies and duration of absence. Regular doctor's notes will not be accepted; only the Student Medical Certificate will be accepted.

In Case of Serious Illness of a Family Member: Provide a Student Medical Certificate to your family member's physician to complete and bring it to the Department (or the Undergraduate Services Office if you are in first year).

In Case of a Death: Obtain a copy of the death certificate or the notice provided by the funeral director's office. You must include your relationship to the deceased and bring it to the Department (or the Undergraduate Services Office if you are in first year). For Other Extenuating Circumstances: If you are not sure what documentation to provide, ask the Departmental Office (or the Undergraduate Services Office if you are in first year) for direction.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

H. ACADEMIC CONCERNS

1. You need to know if your instructors have a policy on late penalties, missed tests, etc. This information may be included on the course outlines. If not, ask your instructor(s).

2. You should also be aware of attendance requirements in some courses. You can be debarred from writing the final examination if your attendance is not satisfactory.

3. If you are in academic difficulty, check out the minimum requirements for progression in the calendar. If in doubt, see your Academic Counsellor.

Calendar References: Check these regulations in your 2023 Western Academic Calendar available at www.westerncalendar.uwo.ca.

Absences Due to Illness:

https://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_135

Academic Accommodations for Students with Disabilities:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_10

Academic Accommodations for Religious or Holy Days:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Course Withdrawals:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=6&SelectedCalendar=Live&ArchiveID=#Page_75

Examinations:

<http://www.westerncalendar.uwo.ca/PolicyPages.cfm?PolicyCategoryID=5&command=showCategory&SelectedCalendar=Live&ArchiveID=>

Scheduling of Term Assignments:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=5&SelectedCalendar=Live&ArchiveID=#SubHeading_78

Scholastic Offences:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_20

Student Medical Certificate:

<https://www.eng.uwo.ca/files/undergraduate/student-medical-certificate.pdf>

Engineering Academic Regulations:

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=4&SelectedCalendar=Live &ArchiveID=#Page_86

Note: These instructions apply to all students registered in the Faculty of Engineering regardless of whether the courses are offered by the Faculty of Engineering or other faculties in the University.

Add Deadlines: First term half course (i.e. “A” or “F”) September 15, 2023 Full courses and full-year half course (i.e. “E”, “Y” or no suffix) September 15, 2023 Second term half course (i.e. “B” or “G”) January 16, 2024

Drop Deadlines: First term half course without penalty (i.e. “A” or “F”) November 13, 2023 Full courses and full-year half courses without penalty (i.e. “E”, “Y” or no suffix) November 30, 2023 Second term half or second term full course without penalty (i.e. “B” or “G”) March 7, 2024

Contact Information:

Undergraduate Services Office: SEB 2097 Phone: 519-661-2130 E-mail: engugrad@uwo.ca

Chemical & Green Process Engineering: TEB 477 Phone: 519-661-2131 E-mail: cbeugrad@uwo.ca

Civil Engineering: SEB 3005 Phone: 519-661-2139 E-mail: civil@uwo.ca

Computer, Electrical, Mechatronic Systems & Software Engineering TEB 279 Phone: 519-661-3758 E-mail: ecceugrad@uwo.ca

Integrated Engineering ACEB 2410 Phone: 519-661-6725 E-mail: engceli@uwo.ca

Mechanical Engineering: SEB 3002 Phone: 519-661-4122 E-mail: mmeundergraduate@uwo.ca Revised 06/25/2023