

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

**CEE 2217A: Introduction to Environmental Engineering
Course Outline 2024/2025**

This course introduces the application of science and engineering principles to understand environmental processes, including the links between human activity, environmental sustainability, and engineering design. The course emphasizes the role of the engineer in protecting human health and the environment. The course provides an introduction to environmental engineering principles, but also provides concepts that are relevant to all civil engineering careers. The general objectives are for the student to become able to:

- Identify key components of the physical environment and how they are influenced by human activity.
- Understand the challenges of population growth, climate change, and sustainability, and their relevance for engineering practice.
- Apply fundamental principles of physics and chemistry for analyzing and solving engineering problems related to water resources, water pollution, water and wastewater treatment, and solid waste management.
- Recognize how culture, societal factors, and economics frame environmental issues and engineering solutions.
- Understand the concepts of sustainable development and design, and environmental stewardship.
- Improve communication and teamwork skills through undertaking individual written components in assignments, working on a group project, and delivering a group presentation.

Calendar Copy: A course introducing the application of chemistry and engineering principles to an understanding of environmental issues associated with human activity. Topics include mass and energy transfer, environmental chemistry, water and air pollution, pollutant transport modeling, pollution management, and risk assessment.

Antirequisite(s): Chemistry 2210A/B.

Prerequisite(s): Chemistry 1302A/B or the former Chemistry 1024A/B.

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

Contact Hours:

3 lecture hours/week;

Lectures are organized into learning modules/units. Review of lecture material and attendance at lecture sessions should take approximately 6 hours per week.

2 tutorial hours/week;

A 2-hour tutorial session will be delivered each week during the scheduled tutorial hours. Students seeking assistance with assignments or clarification on lecture material are strongly encouraged to attend these tutorials. Example problems will also be solved during some tutorial sessions.

Key Sessional Dates:

Classes begin: September 5, 2024

Fall Reading Week: October 14 – October 18, 2024

Classes end: December 6, 2024

Exam period: December 9 – 22, 2024

Contingency plan for an in-person class pivoting to 100% online learning

“In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will not change. Any remaining assessments will also be conducted online at the discretion of the course instructor”

Instructor:

Dr. Christopher Power

e-mail: cpower24@uwo.ca

Office hours: TBA

Textbook:

Course notes (with gaps) will be provided. These should be downloaded from the course website in advance of the lecture. The gaps will be filled in during the lectures and should be done by the student in their own set of notes; this promotes active learning. Solutions to example problems will also be provided during the lectures and tutorials, and these, as well as the gap-filled notes, will **NOT** be posted on the course website.

Students are responsible for checking the course OWL Brightspace site (<http://westernu.brightspace.com>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL Brightspace: [http:// westernu.brightspace.com](http://westernu.brightspace.com)

If students need assistance with the course OWL Brightspace site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Units:

Both SI and FPS unit systems may be used in lectures, laboratories, tutorials, and examinations.

Specific Learning Objectives [GA Indicator – bold denotes evaluated indicator]:

I. Human Population Growth, Climate Change and Sustainability

At the end of this section, the student should be able to

- (a) Appreciate the challenge of population growth for environmental sustainability and engineering practice [IESE1].
- (b) Understand, differentiate and manipulate equations for exponential and logistic growth and apply to environmental problems including population growth [KB1, CS2].
- (c) Understand the basic science of climate change, its drivers and predicted trajectories, and how this relates to engineering design [IESE1].
- (d) Appreciate the principles of sustainable development and design [**IESE 2**].

II. Water Resources

At the end of this section, the student should be able to:

- (a) Recognize the major parts of the hydrologic cycle [KB3]
- (b) Understand material balances and solve hydrologic mass balance problems [KB3, PA1, **PA2**].
- (c) Understand and apply the basic principles of rainfall and runoff analysis [KB4, PA2].
- (d) Recognize the effect of urbanization on stormwater runoff and appreciate different stormwater management approaches [IESE1, **IESE2**]
- (e) Understand the basic principles of groundwater resources and perform groundwater flow calculations [KB3,PA2,**PA3**].

III. Water Pollution

At the end of this section, the student should be able to:

- (a) Identify the physical and chemical properties of water [KB2, KB3].
- (b) Articulate the social and geopolitical dimensions of water pollution, water shortages and water disparity [**IESE1, IESE3, PR2, CS2, CS3**].
- (c) Understand the major classes of pollutants in environmental water systems, such as pathogens, nutrients, heavy metals, and emerging contaminants [KB3, KB4].
- (e) Appreciate water quality standards and regulations [PR2].
- (f) Demonstrate knowledge of professional ethics related to water pollution and engineering issues [**EE1, PR2**].

IV. Drinking Water and Wastewater Treatment

At the end of this section, the student should be able to:

- (a) Recognize drinking water sources and advantages and disadvantages of different sources [KB4]
- (b) Understand the physical and chemical processes behind each stage of conventional drinking water treatment process [KB3, KB4].
- (c) Understand the physical and chemical processes behind each stage of conventional wastewater treatment process [KB3, KB4].
- (d) Perform calculations related to drinking and wastewater treatment technologies [PA2, **PA3**]

V. Solid Waste Management

- (a) Understand modern waste management practices including the role of landfills [KB4].
- (b) Appreciate 3R's (Reduce, Reuse and Recycle) in the design of a waste management strategy and be familiar with the advantages and limitations of recycling [KB4, IESE1, **IESE3**]
- (c) Describe alternative techniques for waste treatment (incineration and energy from waste; composting; bioconversion; waste processing and landfilling) [KB4]
- (d) Understand basic principles of landfill design to minimize environmental impact including water and air pollution and perform calculations [KB4, IESE1].

The instructor may expand, or revise, 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	T	Engineering Tools		Impact on Society	E (I)
Problem Analysis	E (I)	Team Work	I (I)	Ethics and Equity	I (I)
Investigation		Communication	E (I)	Economics and Project Management	
Design		Professionalism	I (I)	Life-Long Learning	I (I)

Accreditation Units:

Natural Science = 35% = 22.05 AUs

Engineering Science = 40% = 25.2 AUs

Complementary Studies = 25% = 15.75 AU

Evaluation:

The final course grade will be determined as follows:

Midterm Test	20%
Final Examination	40%
Assignments	20 %
Project	10 %
Participation	10 %
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Total	100 %

Notes:

- a) **Students must pass the final examination to pass this course.** Students who fail the final examination will be assigned the aggregate mark, as determined above, or 48%, whichever is less.
- b) **Students who have failed this course previously must repeat all components of the course.** No special permissions will be granted enabling a student to retain assignment or test marks from previous years. Previously completed assignments cannot be resubmitted.

Assessment Categories:

1. Midterm Exam

A 1.5-hour midterm exam will be held on October 29, 2024. The exam will cover material from the first six weeks of class and will be closed book. **Academic consideration will not be given for this assessment without appropriate documentation.**

2. Final Examination

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

3. Assignments

There will be 3 assignments during the term. The purpose of the assignments is to help students in their assimilation and synthesis of the material, to develop their communication skills, and to prepare for the midterm and final exam. Assignment questions will consist of a mix of short answer and problem-based computational questions.

Assignments will be due electronically as a PDF through the course website; if completed by hand, then the assignment must be converted to a **very clear and legible PDF** for submission (instructions will be provided). Completion using software (Word, OneNote, Excel, etc.) is ideal for easy conversion to PDF. Submission in any format other than a single PDF (unless otherwise indicated in the cover page of the assignment) will be assigned a mark of zero.

All written submissions will be passed through Turnitin to ensure no copying or plagiarism. You may discuss the assignments with colleagues but the work you turn in must be yours alone. Assignments are to be submitted prior to **11:55 pm on the due date**. Late assignments will be assessed a penalty of 10% per day, to a maximum of 4 days, after which they will receive a mark of zero. Request for extensions for legitimate reasons (e.g., sickness) must follow appropriate procedures; see “**Academic Consideration for Student Absence**” section below. **The maximum number of missed assignments for each student will be one;** if more than one assignment is missed a student may be barred from writing the final exam.

Tentative Assignment Schedule:

Assignment	Published	Due	Returned by
1	September 24	October 4	October 14
2	October 8	November 1	November 4
3	November 5	November 22	December 2

4. Project

A group research project will be assigned. Groups will be randomly assigned. The project runs throughout the course with a written and an oral deliverable. A component of peer review is included to ensure equal contribution from all group members. Full details provided in a separate document.

5. Participation

Participation is an important component of this course. It will be assessed in primarily three ways:

- a) Attendance and verbal contribution during lectures and student presentations
- b) Participation in the “test-your-learning” quizzes and polls using iClicker

- c) Posting relevant, original, constructive material to the Discussions page on the OWL Brightspace website (both original posts and replies)

Information regarding iClicker Cloud

Classroom Polling

We will be using a cloud-based student response software by iClicker in class this semester. This will help me understand what you know, give everyone a chance to participate in class, and provide more interaction on concepts and example questions. We will also be using this software to keep track of attendance. At the start of every class you will JOIN my class; only after you do this will you be able to answer any poll questions posted. It does not matter if you answer right or wrong, there are no marks assigned for correctness. You only get marks for participating. Participating in the polls also, at the same time, registers your attendance. Participating in the majority of questions asked each day shows you were present in class that day.

You will need to create an iClicker Reef Student account to participate in class using your laptop, smart phone, or tablet connected to the university Wi-Fi.

Creating Your iClicker Reef Student Account

Go to iclicker.com/students or download the iClicker Reef Student app for your Apple or Android device to sign up for a Reef account. Those using the mobile app must have it updated to version 5.0.4 (Oct 2018) or newer. You should use your university email address and your University ID (e.g., “cpower24” for student cpower24@uwo.ca) in the Student ID field. You can edit your email address, password, or student ID from your account profile. Do not create and use more than one Reef account as you will only receive credit from a single account.

You do not need to purchase anything – iClicker Cloud is fully supported by Western and is free to all its students. Make sure you choose **Western University Ontario** when signing up.

Add This Course to Your Reef Account

- Use the + sign to search for my course in iClicker Reef.
- In the “Find Your Institution” field, enter **Western University Ontario**
- In the “Find Your Course” field, enter **CEE 2217 F24 - Intro to Enviro Eng**
- Click “Add This Course” and it will be added to the main screen of your iClicker Reef account

Participating

- Each time our class meets, make sure you have selected my course from the main screen of your iClicker Reef account.
- When I start a session, click the **Join** button that appears on your screen, then answer each question I ask in iClicker Reef.
- For short answer and numeric questions, make sure you press **Send**.

Keep Track, Review, Study

- You can review your grades, performance, and participation in iClicker Reef
- You can use the questions I asked during class as flashcards or practice tests in the Study Tools section of iClicker Reef.

Academic Integrity Information

iClicker activities fall under the provisions of our campus academic honesty policy. Students must not engage in academic dishonesty while participating in iClicker activities. This includes but is not limited to:

- Checking in while not physically in class
- Having another student check you into class
- Answering polling questions while not physically in class
- Looking at other students' devices while answering live questions
- Using more than one iClicker remote or account at a time

Any student found to be in violation of these rules will lose polling points for the entire term and may be reported to the Dean of Engineering.

General Regulations and Procedures:

I. Missed/Late Accommodation Policy:

1. Students missing an assignment or examination will report the absence by submitting Academic Consideration Request form through [STUDENT ABSENCE PORTAL](#).
2. Documentation must be provided as soon as possible.

II. Exam Accommodation:

1. If you are unable to write a final examination, report your absence using the Academic Consideration Request Form through [STUDENT ABSENCE PORTAL](#).
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 the Academic Consideration Request Form through [STUDENT ABSENCE PORTAL](#). PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

III. Late Assignments:

1. Students must advise the course instructor if they are having difficulty completing an assignment on time (prior to the due date of the assignment).
2. Students should be prepared to submit the Academic Consideration Request Form and provide documentation if requested to do so by the course instructor (see reverse side for information on documentation).
3. If granted an extension, a revised due date should be established with the course instructor. 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 are completed prior to the last day of classes.
4. This course has 3 assignments with each assignment counted towards your final course grade. Academic consideration will not be granted for missed assignments. The maximum

number of missed assignments for each student will be one; if more than one assignment is missed a student may be barred from writing the final exam.

5. The assignment deadlines can be found above in the course outline. For each assignment, students are expected to submit the assignment by the deadline listed. Late assignments will be assessed a penalty of 10% per day, to a maximum of 4 days, after which they will receive a mark of zero. If you have a long-term academic consideration or an accommodation for disability that allows greater flexibility than provided here, please reach out to your instructor at least one week prior to the posted deadline.
6. 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.

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

IV. Medical Accommodation:

1. Requests for Academic Consideration Request Form through [STUDENT ABSENCE PORTAL](#).
2. Requests for academic consideration must include the following components:
 - a. Self-attestation signed by the student (*This is only accepted for the first/one absence*)
 - b. Medical note
 - c. Indication of the course(s) and assessment(s) affected by the request
 - d. Supporting documentation as relevant
3. Requests without supporting documentation are limited to one per term per course.
4. **Students must request academic consideration as soon as possible and no later than 48 hours after the missed assessment.**
5. Once the request and supporting documents have been received and reviewed, appropriate academic consideration, if granted, shall be determined by the instructor in consultation with the academic advisor, in a manner consistent with the course outline. Academic consideration may include extension of deadlines, waiver of attendance requirements for classes/labs/tutorials, or re-weighting of course requirements. Some forms of academic consideration, such as arranging Special Examinations, assigning a grade of Incomplete, or granting late withdrawals without academic penalty, may only be granted by the Academic Advising office of the Faculty of Engineering.

V. Religious Accommodation:

When scheduling unavoidably conflicts with religious holidays, which (a) require an absence from the University or (b) prohibit or require certain activities (i.e., activities that would make it impossible for the student to satisfy the academic requirements scheduled on the day(s) involved), no student will be penalized for absence because of religious reasons, and alternative means will be sought for satisfying the academic requirements involved. If a suitable arrangement cannot be worked out between the student and instructor involved, they should consult the appropriate Department Chair and, if necessary, the student's Dean.

It is the responsibility of such students to inform themselves concerning the work done in classes from which they are absent and to take appropriate action.

VI. Academic Integrity:

In the Faculty of Engineering, we encourage students to create a culture of honesty, trust, fairness, respect, responsibility, and courage, befitting the professional degree you are pursuing.

Please visit [Academic Integrity Western Engineering](#) for more information.

VII. Academic Offences:

Plagiarism means using another's work without giving credit. The university has rules against plagiarism and other scholastic offences. Western Engineering has a zero-tolerance policy on plagiarism. The minimum penalty is zero on the course work and a repeat offence will earn you zero on the course. A third offence may lead to expulsion from the university.

[Scholastic Discipline for Undergraduate Students](#) & [Cheating, Plagiarism and Unauthorized Collaboration: What Students Need to Know](#)

Students must write their reports, essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (<http://www.turnitin.com>). Scholastic offences are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

VIII. Faculty of Engineering AI Policy:

The use of generative Artificial intelligence (GenAI) tools won't be discouraged in the Faculty of Engineering. As we pride ourselves on building the future we can't hide from the use of GenAI tools to contribute to the understanding of the course materials. However, the use of GenAI tools in any assignment or contribution during the course will have to be disclosed, as a resource.

GenAI tools use won't be permitted in any type of examination or other assessments where the faculty have prohibited their use. If use of GenAI tools is detected by the instructor in these instances, academic offences penalties might be imposed against the student.

IX. Use of English Policy:

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work except for the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

X. Accessibility:

Western is committed to achieving barrier free accessibility for persons with disabilities studying, visiting and working at Western. As part of this commitment, there are a variety of services, groups and committees on campus devoted to promoting accessibility and to ensuring that individuals have equitable access to services and facilities. To help provide the best experience to all members of the campus community, please visit the [Accessibility Western University](#) for information on accessibility-related resources available at Western.

Students with disabilities may arrange for academic accommodation at Western. For a more detailed explanation, please visit [Academic Support & Engagement -Academic Accommodation](#).

XI. Inclusivity, Diversity, and Respect:

The Faculty of Engineering at Western University is committed to creating equitable and inclusive learning environments that value diverse perspectives and experiences. We recognize that university courses often marginalize students based on social identity characteristics such as, but not limited to, Indigeneity, race, ethnicity, nationality, ability, gender identity, gender expression, sexuality, age, language, religion, and socioeconomic status. Understanding this, we strive to facilitate equitable experiences and inclusion within the classroom by respecting and integrating multiple ways of knowing, being, and doing. Please visit the [Office of Equity, Diversity and Inclusion](#).

XII. Health and Well-Being:

- [Health & Wellness Services – Students](#) - Offers appointment-based medical clinic for all registered part-time and full-time students.
- [Mental Health Support](#) - Provides professional and confidential services, free of charge, to students needing assistance to meet their personal, social and academic goals. Services include consultation, referral, groups and workshops, as well as brief, change-oriented psychotherapy.
- [Crisis Support](#) - For immediate assistance, please visit Thames Hall Room 2170 or call 519-661-3030. The crisis clinic operates between 11:00 am - 4:30 pm. For after-hours crisis support, click [here](#).
- [Gender-Based Violence and Survivor Support](#) - 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.

Important Contacts:

Engineering Undergraduate Services	SEB 2097	519-661-2130	engugrad@uwo.ca
Civil & Environmental Engineering	SEB 3005	519-661-2139	civil@uwo.ca
Office of the Registrar/Student Central	WSSB 1120	519-661-2100	

Important Links:

- [WESTERN ACADEMIC CALENDAR](#)
- [ACADEMIC RIGHTS AND RESPONSIBILITIES](#)