Civil Engineering
CIVENG 2B04
Principles of Environmental Engineering
Fall 2026

McMaster University
ENGINEERING

Instructor Information



Hui Guo
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Office Hours:
By Appointment

TA Information

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Class Times

Lectures: Mon 8:30AM - 10:20AM and Wed 8:30AM - 9:20AM

Labs: Five separate 3-hour sections. Refer to Mosaic or Avenue for your assigned schedule.

Tutorials: Two separate 2-hour sections. Refer to Mosaic or Avenue for your assigned schedule.

More details will be shared during classes.

Class Format

In Person

Course Dates: 09/08/2026 - 12/10/2026
Units: 4.00
Course Delivery Mode: In Person
Course Description: Sustainability, ecosystems and climate change; mass balance; reaction kinetics; reactor theory; water quality; water and wastewater treatment; solid waste management; air pollution control. Three lectures, one tutorial (two hours), one lab (three hours); first term Prerequisite(s): Registration in Level II Engineering or permission of the Department

Instructor-Specific Course Information

AVENUE TO LEARN

The avenue site will be used to post course schedules, lecture notes, assignments, solutions, etc. **It is the student's responsibility to check the avenue course website on a regular basis during the term.**

COURSE TEXTBOOK

The purchase of the course textbook is recommended: Principles of Environmental Engineering and Science, S.J. Masten and M.L. Davis, McGraw Hill, 4th Edition (2020). Additionally, there are numerous textbooks on environmental engineering available in the Thode Library.

COURSE NOTES

Course notes will be posted on avenue in sections over the duration of the term. **The course notes are not intended to replace class or the textbook.**

EXAMINATIONS

There will be 4-5 quizzes and one final examination in this course. The final examination will test cumulative knowledge from the entire term. The McMaster Standard Calculator (Casio fx991) may be used on examinations.

ASSIGNMENTS

There will be 4-6 assignments in this course. Assignments will be posted on the avenue site a minimum of one week before they are due. These assignments are to be submitted through drop box near Civil Engineering office or A2L. Assignment solutions will be posted on the avenue site one week after the due date. Late assignments will be penalized 20% per day until reaching grade 0.

GROUP WORK

There are group work components in this course. Students will work in groups in the laboratory and for the course project. **Group work in this course cannot be MSAFed.** For the laboratory sessions, students are allowed to select their group members from their own laboratory section during the laboratory introduction sessions (30-60 min), which will be run during the week of September 21st. All group members must participate in all labs; attendance will be taken. For the course project, students are allowed to select their group members from their own tutorial section for the course project.

TUTORIALS

Tutorials alternate with labs with some exceptions; the tutorial schedule is included in this course outline. Any schedule changes will be announced in class and on avenue.

LABORATORY SESSIONS

As part of this course, each student must participate in four mandatory laboratory experiments. The labs provide supplemental exposure to several of the concepts we will be covering over the course of this term. The lab schedule is included in this course outline. Lab experiments will be conducted in groups of three or four.

All group members must participate in all labs. Each group is responsible for submitting a report for each lab. Each lab will be graded. **All group members will receive the same grade, except when individual penalty applies.** All group members are expected to take part in the report preparation. A statement describing the contribution of each group member should be included in the lab report. Failure to clearly demonstrate each member's contribution could result in an individual or group penalty ranging from 10% to 50%. A formal report structure is expected for each laboratory write-up. Suppose that you are working as a professional engineer and prepare your laboratory reports accordingly. Guidelines for the report structure and the marking scheme are available on avenue. Follow these guidelines carefully to achieve the best possible grade on your laboratory reports. Late laboratory reports will receive a penalty of 10% per day late with no exceptions.

Important Links

- Mosaic
- Avenue to Learn
- Student Accessibility Services - Accommodations
- McMaster University Library
- eReserves
- Open Education Resources

Course Learning Outcomes

- 1. Sustainability & Environmental Impact: apply the three pillars of sustainability to engineering projects, evaluate environmental impacts, identify uncertainties, and understand sustainability metrics. (CEAB indicator:9.1)
- 2. Engineering Calculations & Material Balances: develop and solve differential equations describing changes in material concentration over time using appropriate assumptions and engineering fundamentals. (CEAB indicators: 2.1, 7.1)
- 3. Reaction Kinetics: describe chemical concepts, concentration units, equilibrium, and reaction kinetics, demonstrating comprehension of technical instructions and analytical reasoning. (CEAB indicators: 2.1, 7.1)
- 4. Reactor Theory Understand boundary conditions for batch, CSTR, and

PFR reactors; develop material balance equations; and apply reactor models to natural and engineered systems. (CEAB indicators: 2.1, 7.1)

- 5. Water Quality Identify contaminant categories and sources, interpret acceptable concentration ranges, and analyze case studies of water contamination with attention to environmental impact. . (CEAB indicators: 7.1, 9.1)
- 6. Drinking Water and Wastewater Treatment Explain physical and chemical processes in conventional water treatment and assess their environmental impacts. (CEAB indicators: 7.1, 9.1)
- 7. Solid Waste Management Understand principles of solid waste generation, handling, treatment, and disposal, and evaluate environmental impacts and sustainable alternatives. (CEAB indicators: 7.1, 9.1)
- 8. Laboratory Skills & Data Interpretation Perform calibration, titration, tracer studies, and BOD analysis; interpret experimental data using appropriate assumptions and engineering fundamentals. (CEAB indicators: 2.1, 7.1)
- 9. Communication & Project Work Demonstrate comprehension of technical instructions, communicate project concepts clearly, and present environmental engineering solutions concisely. (CEAB indicators: 7.1, 9.1)

Graduate Attributes

02 PROBLEM ANALYSIS: 2.1 Identifies and states reasonable assumptions and suitable engineering fundamentals, before proposing a solution path to a problem.

07 COMMUNICATION SKILLS: 7.1 Demonstrates comprehension of technical and non-technical instructions and questions.

09 IMPACT OF ENGINEERING ON SOCIETY AND THE ENVIRONMENT: 9.1 Evaluates the environmental impact of engineering activities, identifies uncertainties in decisions, and promotes sustainable design.

Lab Safety

The Faculty of Engineering is committed to McMaster University's Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs". **It is your responsibility to understand McMaster University**

Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Health and Safety. The Lab Safety Handbook is available here, as well as on A2L.

The first lab session will be a safety orientation to JHE 220.

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment (see course lab manuals) and the laboratory equipment. The safety requirements for JHE 220 are listed below:

- Wearing lab coats in water labs is mandatory.
- Glasses or safety glasses/goggles must be worn in the lab at all times.
- Contact lenses are not to be worn in the lab.
- No short (i.e., above the knee) pants or skirts are permitted in the lab – lab coats must be worn over top of your clothing in these instances.
- Closed-toe shoes must be worn at all times.
- No loose clothing allowed.
- Long hair must be tied back.
- Gloves must be worn when working with hazardous chemicals (as indicated by the laboratory instructor).

Additionally, McMaster University's workplace health and safety guidance related to COVID-19 must always be followed (available from https://hr.mcmaster.ca/resources/covid19/workplace-health-and-safety-guidance-duringcovid-19/).

Course Schedule

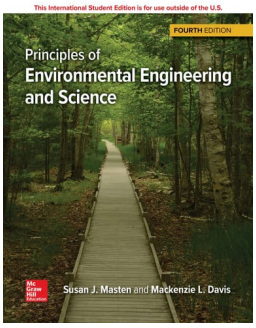
A weekly breakdown of the course schedule

Week	Topic	Assessment
1	Introduction	/
2	Engineering Dimensions and Calculations	Tutorial 1
3	Sustainability	Lab Safety Session, Tutorial 2
4	Material Balances	Lab 1
5	Material Balances and Reaction Kinetics	Tutorial 3
Midterm Break		
6	Reaction Kinetics	Lab 2
7	Reactor Theory	Tutorial 4

Week	Topic	Assessment
8	Water Quality	Lab 3
9	Water Quality Management	Tutorial 5
10	Drinking Water Treatment	Lab 4
11	Wastewater Treatment	Tutorial 6 (TBD)
12	Wastewater Treatment	Tutorial 7
13	Solid Waste Management and final Review	/

Required Materials and Texts

Please sign in with your MacID here to view your booklist



Principles of Environmental Engineering and Science
ISBN: 9781260548020
Authors: Susan J. Masten, Mackenzie Leo Davis
Publisher: McGraw-Hill Education
Publication Date: 2019-03-29
Edition: 4

Course Evaluation

- Assignments: 10%
- Group Project: 10%
- Lab Reports: 20%
- Quizzes: 25%
- Final Exam: 35%

Undergraduate Grading Scale

The McMaster 12 Point Grading Scale

Grade	Equivalent Grade Point	Equivalent Percentages
A+	12	90-100
A	11	85-89
A-	10	80-84
B+	9	77-79
B	8	73-76
B-	7	70-72
C+	6	67-69

Grade	Equivalent Grade Point	Equivalent Percentages
C	5	63-66
C-	4	60-62
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49

Generative AI: Some Use Permitted

Students may use generative AI in this course in accordance with the guidelines outlined for each assessment, and so long as the use of generative AI is referenced and cited following citation instructions given in the syllabus. Use of generative AI outside assessment guidelines or without citation will constitute academic dishonesty. It is the student's responsibility to be clear on the limitations for use for each assessment and to be clear on the expectations for citation and reference and to do so appropriately.

Turnitin.com

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

APPROVED ADVISORY STATEMENTS

Academic Integrity

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy.

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

Authenticity / Plagiarism

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. Avenue to Learn, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism

detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

Courses with an On-line Element

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn, LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

Online Proctoring

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online.**

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

Academic Accommodation of Students with Disabilities

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

Requests for Relief for Missed Academic Term Work

In the event of an absence for medical or other reasons, students should review and follow the Policy on Requests for Relief for Missed Academic Term Work.

Academic Accommodation for Religious, Indigenous, or Spiritual Observances (RISO)

Students requiring academic accommodation based on religious, Indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

Copyright and Recording

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

Extreme Circumstances

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, Avenue to Learn and/or McMaster email.