Historical / Conversion
CIVENG 2B04
Principles of Environmental Engineering
Fall 2023

Instructor Information

Zhong (Zoe) Li
Email: zoeli@mcmaster.ca
Office Hours:
JHE329A, Tu 10:30AM - 11:20AM

Course Information

Lectures: TuThFr 11:30AM - 12:20PM
Labs: L01 Mo 2:30PM - 5:20PM; L02 Tu 8:30AM - 11:20AM; L03 We 2:30PM -5:20PM; L04 Th 2:30PM - 5:20PM; L05 Th 8:30AM - 11:20AM
Tutorials: T01 We 10:30AM - 12:20PM; T02 Fr 4:30PM - 6:20PM
Laboratory Technician: Monica Han E-mail: hanm7@mcmaster.ca
Teaching Assistants: Natalia Shiu E-mail:
Zehao Yan E-mail: yanz52@mcmaster.ca
Matthew Hamilton Email: hamilm31@mcmaster.ca

Course Dates: 09/05/2023 - 12/06/2023
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 (2019). 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 four quizzes (best 3/4 counted) 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

This course will require the completion of five assignments. One assignment will be given and collected in tutorial. The other assignments will be posted on the avenue site a minimum of one week before they are due. These assignments are to be submitted through *avenue*. Assignment solutions will be posted on the avenue site one week after the due date. Late assignments will be penalized 10% per day, up to a maximum of 70% at which point they will receive a grade of zero (since the solutions will be released).

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.** Students are allowed to select their group members from their own laboratory section during the laboratory introduction sessions, which will be run during the week of September 11th. All group members must participate in all labs; attendance will be taken. Students are also 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 will be posted on *avenue*.

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, and **all group members will receive the same grade**. 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 a 10% - 50% penalty.

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

Course Learning Outcomes

- A07 COMMUNICATION SKILLS: 7.1 Demonstrates comprehension of technical and non-technical instructions and questions.
- A07 COMMUNICATION SKILLS: 7.2 Composes an effective written document for the intended audience.
- A09 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.

Course Learning Goals

- Sustainability: apply the three pillars of sustainability to engineering projects, and have an understanding of the metrics used to evaluate sustainability. (7.1, 7.2, 9.1)
- Material Balances: develop a differential equation describing the change in material concentration in a system over time, and solve problems with specific boundary conditions. (7.1, 7.2)
- Reactions: describe basic chemical concepts, be familiar with concentration units, understand chemical equilibrium and reaction kinetics. (7.1, 7.2)
- Reactors: understand the boundary conditions of batch, continuous flow stirred tank, and plug flow reactors; develop material balance equations for each of these kinds of reactors, and use these reactors to develop models of natural systems. (7.1, 7.2)

- Water Quality: know the categories and sources of contaminants, be familiar with the acceptable concentration ranges of various contaminants, and be familiar with several case studies involving serious cases of water contamination. (7.1, 7.2)

- Drinking Water Treatment: obtain a basic understanding of the physical and chemical processes behind each stage of the conventional drinking water treatment process, as well as basic knowledge of provincial legislation governing drinking water treatment. (7.1, 7.2, 9.1)

- Wastewater Treatment: obtain a basic understanding of the physical and chemical processes behind each stage of the conventional sewage treatment process, as well as basic knowledge of municipal, provincial and federal legislation governing wastewater treatment. (7.1, 7.2, 9.1)

- Solid waste management: obtain a basic understanding of solid waste treatment and management technologies. (7.1, 7.2, 9.1)

- Air pollution control: know the fundamentals of air pollution and obtain a basic understanding of air pollution control technologies. (7.1, 7.2, 9.1)

Required Materials and Texts

Textbook Listing: https://textbooks.mcmaster.ca

Principles of Environmental Engineering and Science
ISBN: 1259893545
Authors: Mackenzie Davis and Susan Masten
Publisher: McGraw Hill
Publication Date: 2020
Edition: 4th Edition

Class Format

In Person

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by e-mail to the student's designated primary e-mail account via their "@mcmaster.ca" alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

Course Evaluation

Assignments	10%
Group Project	10%
Laboratory Reports	20%
Quizzes	30%
Final Exam	30%

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
C	5	63-66
C-	4	60-62

Grade	Equivalent Grade Point	Equivalent Percentages
D+	3	57-59
D	2	53-56
D-	1	50-52
F	0	0-49

Course Schedule

WEEK 1	Introduction	
WEEK 2	Engineering Dimensions and Calculations	Lab Safety session
WEEK 3	Sustainability	Lab 1
WEEK 4	Material Balances	Tutorial 1
WEEK 5	Reaction Kinetics	Lab 2
WEEK 6	Mid-term Recess	
WEEK 7	Reactor Theory	Tutorial 2
WEEK 8	Water Quality	Lab 3
WEEK 9	Water Quality Management	Tutorial 3
WEEK 10	Drinking Water Treatment	Lab 4
WEEK 11	Wastewater Treatment	Tutorial 4
WEEK 12	Solid Waste Management	Tutorial 5
WEEK 13	Air Pollution Control	Tutorial 6

Laboratory Overview, Operation, and 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 and policies". It is your responsibility to understand McMaster University's Risk Management system, which is supported by a collection of Risk Management Manuals (RMMs) that contain programs and policies in support of the Risk Management System. The RMMs are available from https://hr.mcmaster.ca/employees/health_safety_well-being/our-safety/risk-management-manuals-rmms/.

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for specific experiments (see course lab manuals) and the laboratory

equipment. The safety requirements for [redacted] are listed below:

- 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-during-covid-19/).

Absences, Missed Work, Illness

Group work in this course cannot be MSAFed.

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.

Generative AI: Use Prohibited

Students are not permitted to use generative AI in this course. In alignment with McMaster academic integrity policy, it “shall be an offence knowingly to … submit academic work for assessment that was purchased or acquired from another source”. This includes work created by generative AI tools. Also state in the policy is the following, “Contract Cheating is the act of “outsourcing of student work to third parties” (Lancaster & Clarke, 2016, p. 639) with or without payment.” Using Generative AI tools is a form of contract cheating. Charges of academic dishonesty will be brought forward to the Office of Academic Integrity.

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.