

COURSE INFORMATION

Course Name: Principles of Environmental Engineering

Course Code: CIV ENG 2B04

Session Offered: Fall 2020

Calendar Description: 4 units. Fundamentals of reaction kinetics; mass and energy balances; reactor theory; ecological systems; water quality; water and wastewater treatment; sustainability; and climate change. Three lectures, one tutorial or one lab; first term. Prerequisite(s): Registration in Level II Engineering or permission of the department.

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Office Hours/Contact: We 11:30AM – 12:30PM

Class Schedule Days & Times:

Lectures: TuWeFr 12:30PM - 1:20PM

Labs: Mo 9:30AM - 12:20PM (L01); We 3:30PM - 6:20PM (L02); Fr 2:30PM - 5:20PM (L03); Tu 2:30PM - 5:20PM (L04); Th 2:30PM - 5:20PM (L05)

Tutorials: Fr 9:30AM - 11:20AM (T01); Th 9:30AM - 11:20AM (T02)

Location: Virtual

1. COURSE OBJECTIVES

The objective of the course is to introduce principles and practices of environmental engineering related to water pollution, water treatment, and wastewater treatment.

2. COURSE SPECIFIC POLICIES

AVENUE TO LEARN (A2L)

The A2L site will be used to post course schedules, lecture notes, assignments, solutions, etc. It is the student's responsibility to check the A2L 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 text books 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 text book.

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 six 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 A2L. 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. Self-enrollment groups will be created on A2L for students to choose their own groups. Group work in this course cannot be MSAFed.

TUTORIALS

Tutorials alternate with labs with some exceptions; the tutorial schedule will be post on A2L.

LABORATORY SESSIONS

As part of this course, each student must participate in four VIRTUAL 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 A2L.

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 A2L. 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.

LABORATORY 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 Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Environmental and Health Support Services Occupational Safety Risk Management Manual at: <https://hr.mcmaster.ca/app/uploads/2019/07/2019-McMaster-Lab-Manual.pdf>. It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment. McMaster University's workplace health and safety guidance during COVID-19 should always be followed. The details and updates of this guidance can be found at <https://hr.mcmaster.ca/resources/covid19/workplace-health-and-safety-guidance-during-covid-19/>. To ensure laboratory safety this term in accordance with McMaster University policy related to COVID-19, all labs will be held virtually.

A laboratory-specific set of rules can also be added to ensure that students fully understand laboratory safety rules that are in place prior to their first session.

The safety requirements for JHE-220 are listed below. Students not abiding by these safety requirements will be given one warning. Second offences will result in the student being asked to vacate the laboratory and receiving a grade of zero for that particular lab.

- 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).

3. SCHEDULE

| | | |
|-------------------|--------------------------------------------------------------------------------------------------------|----------------------|
| WEEK 1 | Introduction | Assignment 1 |
| WEEK 2 | Engineering Dimensions and Calculations | |
| WEEK 3 | Sustainability | Assignment 2; Quiz 1 |
| WEEK 4 | Material Balances | |
| WEEK 5 | Reaction Kinetics | Assignment 3 |
| WEEK 6 | Mid-term Recess | Mid-term Recess |
| WEEK 7 | Reactor Theory | Quiz 2 |
| WEEK 8 | Water Quality | Assignment 4 |
| WEEK 9 | Water Quality Management | |
| WEEK 10 | Wastewater Treatment | Quiz 3 |
| WEEK 11 | Wastewater Treatment | Assignment 5 |
| WEEK 12 | Drinking Water Treatment | Quiz 4 |
| WEEK 13 | Drinking Water Treatment | Assignment 6 |
| FINAL EXAMINATION | Scheduled during the regular University Final Examination period established by the Registrar's Office | |

4. ASSESSMENT OF LEARNING

WEIGHT %

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

5. LEARNING OUTCOMES

GRADUATE ATTRIBUTES (GAs) MEASURED IN THIS COURSE

The following Graduate Attributes (GAs) are being measured in this course. While some other GAs are also relevant to this course, they are not being measured in this course and therefore are not listed here.

7: Communication

- 7.1 Demonstrates an ability to respond to technical and non-technical instructions and questions.
- 7.2 Presents instructions and information clearly and concisely.

13: Sustainability

- 13.1 Triple bottom line: an ability to design and evaluate complex open-ended engineering systems using a triple-bottom line of sustainability dimensions: social, economic and environmental.
- 13.2 Metrics and Tools: demonstrate an understanding of and ability to use and interpret sustainability metrics and tools.

When this course is complete, students will be able to (corresponding GAs in brackets):

1. Sustainability: apply the three pillars of sustainability to engineering projects, and have an understanding of the metrics used to evaluate sustainability. (13.1, 13.2)
 2. 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)
 3. Reactions: describe basic chemical concepts, be familiar with concentration units, understand chemical equilibrium and reaction kinetics. (7.1, 7.2)
 4. 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)
 5. 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)
 6. 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)
 7. 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)
- Note that the first two learning objectives will be applied to all topics addressed in this course.

6. COMMUNICATIONS

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 postal mail, by fax, or 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.

7. POLICIES

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](https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/), located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>.

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 DETECTION

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.

COURSES WITH AN ON-LINE ELEMENT

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), 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

[McMaster Student Absence Form \(MSAF\)](#): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

The McMaster Student Absence Form is a self-reporting tool for **Undergraduate Students** to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period. You may submit a maximum of 1 Academic Work Missed requests per term. It is **your** responsibility to follow up with your Instructor immediately regarding the nature of the accommodation. If you are absent more than 5 days or exceed 1 request per term you **must** visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation. This form should be filled out immediately when you are about to return to class after your absence.

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.

PROTECTION OF PRIVACY ACT (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades, and all other personal information at all times. For example, the submission and return of assignments and the posting of grades must be done in a manner that ensures confidentiality – see <http://www.mcmaster.ca/univsec/fippa/fippa.cfm>.

ANTI-DISCRIMINATION

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer, or the Human Rights Consultant, as soon as possible.

https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf

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, A2L and/or McMaster email.

8. MCMASTER 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 |
| D+ | 3 | 57-59 |
| D | 2 | 53-56 |
| D- | 1 | 50-52 |
| F | 0 | 0-49 |