Civil Engineering
CIVENG 2O04
Fluid Mechanics
Winter 2025

McMaster University
ENGINEERING

Instructor Information

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Office Hours:
TBD

TA Information

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Class Times

- Lectures: Tu 4:30PM - 6:20PM; Th 4:30PM - 5:20PM

- Tutorials: Tu 12:30PM - 2:20PM (T01); Th 2:30PM - 4:20PM (T02)
- Labs: Fr 2:30PM - 5:20PM (L01); Fr 8:30AM - 11:20AM (L02);

Class Format

In Person

The topics in this course will be presented in a traditional lecture format, with emphasis on developing physical intuition and mathematical competency. Students are expected to attend and actively participate in the lectures. Tutorials will be used to review and practice key concepts presented in the lectures. Students are encouraged to actively participate in class discussions on Avenue. In-person attendance is required for this course.

Course Dates: 01/06/2025 - 04/08/2025
Units: 4.00
Course Delivery Mode: In Person
Course Description: Fluid properties; hydrostatics; continuity, momentum and energy equations; potential flow; laminar and turbulent flow; flow in closed conduits, transients, open channel flow; hydraulic cross-sections. Three lectures, one tutorial (two hours), one lab (three hours); second term Prerequisite(s): CIVENG 2P04, MATH 2Z03; credit or registration in MATH 2ZZ3 Antirequisite(s): MECHENG 3O04

Important Links

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

Course Learning Outcomes

- Develop the competence in the specialized engineering knowledge of fluid mechanics.

- Obtain the ability to identify reasonable assumptions (including identification of uncertainties and imprecise information) that could or should be made before a solution path is proposed.

- Obtain the ability to manage time and processes effectively, prioritizing competing demands to achieve personal and team goals and objectives.

- Develop the competence to construct effective written arguments.

Graduate Attributes

The Canadian Engineering Accreditation Board (CEAB) is a division of Engineers Canada and is responsible for accrediting undergraduate engineering programs across Canada. Accreditation by the CEAB ensures that the engineering programs meet a national standard of quality and cover essential educational requirements. Graduate Attributes are a set of qualities and skills that the CEAB expects engineering graduates to possess. These attributes are a benchmark for the learning outcomes of accredited engineering programs. This section lists the Graduate Attribute Indicators associated with the Learning Outcomes in this course.

- Graduate Attribute Indicator 1.3: Competence in Engineering Fundamentals. (Course Learning Outcome 1)
- Graduate Attribute Indicator 1.4: Competence in Specialized Engineering knowledge. (Course Learning Outcome 1)
- Graduate Attribute Indicator 2.1: Identifies and states reasonable assumptions and suitable engineering fundamentals, before proposing a solution path to a problem. (Course Learning Outcome 2)
- Graduate Attribute Indicator 6.1: Actively contributes to the planning and execution of a team project. (Course Learning Outcome 3)
- Graduate Attribute Indicator 7.2: Composes an effective written document for the intended audience. (Course Learning Outcome 4)

- Graduate Attribute Indicator 11.2: Plans and effectively manages a project's time, resources, and scope, following business practices as appropriate. (Course Learning Outcome 3)

Lab Information

You are required to participate in all four laboratory sessions. Each group member is expected to contribute equally to the lab report writing to receive mark.

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.

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment. 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 first lab session will be a safety orientation to JHE 121. The safety requirements for JHE 121 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 lab.

- Always conduct yourself in a responsible manner while in the laboratory. Be prepared and professional. NO HORSEPLAY.
- Appropriate Personal Protective Equipment (PPE) should be worn when conducting experiments.
- Follow all written and verbal instructions carefully. If you do not understand a direction or part of a procedure, ASK YOUR TA or LAB TECHNICIAN BEFORE

PROCEEDING WITH THE ACTIVITY.

- Perform only those experiments indicated by the lab manual or your TA/lab technician. Carefully follow all instructions, both written and oral. Unauthorized experiments are not allowed.
- No food or drink in the laboratory.
- Keep work areas clean and tidy. Place backpacks and overcoats in the cubbies provided.
- Be alert and proceed with caution at all times in the laboratory. Notify the TA or lab technician immediately of any unsafe conditions you observe.
- Stay focused on your lab procedures and do not interfere with others. Cell phones should only be used to record data.
- Dress appropriately for each laboratory activity as outlined by the lab supervisor and door signage for each lab.
- Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the TA or lab technician immediately.

Course Schedule

A weekly breakdown of the course schedule

Week	Topic	Assessment
1	Introduction & Physical Properties of Fluids	
2	Dimensional Analysis	HW1
3	Fluid Statics	
4	Pressure Forces on Surfaces	HW2
5	Buoyancy and Rotational Stability	
Midterm Break		
6	Capillarity and Wetting Phenomenon	HW3
7	Kinematics	

Week	Topic	Assessment
8	Control Volume & Conservation Equations	
9	Bernoulli's Principle	HW4
10	Open Channel Flow	
11	Flow Control & Measurement	HW5
12	Viscous Flow	
13	Review	HW6

Required Materials and Texts

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

There are no required materials and texts.

Optional Course Materials

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

Fundamentals of Fluid Mechanics
ISBN: 9780470262849
Authors: Bruce Roy Munson, T. H. Okiishi, Wade W. Huebsch
Publisher: Wiley
Publication Date: 2009
Edition: Sixth Edition

Course Evaluation

Item	Weight
Homework assignments	3%
Laboratory reports	20%
Class participation	7%
Midterm exam	30%

Item	Weight
Final exam	40%

Course Evaluation Details

- Homework assignments are not graded for accuracy or content. Full credit (0.5%) will be awarded for each homework submission.
- Laboratory reports are to be completed in groups of four. Equal contribution from each student is required to earn credit.
- Class participation will be assessed through Top Hat (5%). Students can earn up to 2% bonus points by submitting original fluid-related photos and videos for the Course Instagram.

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

Late Assignments

- Late submissions will not be considered.

Absences, Missed Work, Illness

- 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 mustvisit 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.
- Under normal circumstances, students submitting an MSAF will be granted a 1-week extension to the missed academic work, starting from the original listed deadline.

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.

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, located at https://secretariat.mcmaster.ca/university-policies-proceduresguidelines/

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.

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.

Equity, Diversity, and Inclusion

The Faculty of Engineering is committed to creating an environment in which students of all genders, cultures, ethnicities, races, sexual orientations, abilities, and socioeconomic backgrounds have equal access to education and are welcomed and treated fairly. If you have any concerns regarding inclusion in our Faculty, in particular if you or one of your peers is experiencing harassment or discrimination, you are encouraged to contact the Chair, Associate Undergraduate Chair, Academic Advisor or to contact the Equity and Inclusion Office.

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.

Academic Advising

For any academic inquires please reach out to the Office of the Associate Dean (Academic) in Engineering located in JHE-Hatch 301.

Details on academic supports and contact information are available from:

https://www.eng.mcmaster.ca/programs/academic-advising

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.