



Course Outline

Instructor

Ella Morris, E.I.T
E1-330 EITC
(204) 474-7919
Ella.Morris@umanitoba.ca

Student Hours

Tuesday 1:00 to 2:00 PM
Or by appointment.

Teaching Assistant

Mahdi Alaei Varnosfaderani
alaeivam@myumanitoba.ca

Lecture

207 Human Ecology Bldg.
TR 10:00-11:15 am

Tutorial/Lab

207 Human Ecology Bldg.
Tutorial/Lab Time:
R 2:30 -4:30 pm

Contact Hours

Lectures:
3 hrs x 13 weeks = 39 hrs
Tutorial/Lab:
3 hrs x 13 weeks = 39 hrs

Prerequisites

ENG 1440 (or ENG 1441)
MATH 1710 or MATH 1700
Not to be held with CIVL 2790

Course Website:

<http://umanitoba.ca/umlearn>

Traditional Territories Acknowledgement

The University of Manitoba campuses are located on the original lands of the Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

BIOE 2790 Fluid Mechanics

Credit Hours: 4

Calendar Description

This course introduces the fundamental principles guiding fluid flow in closed conduits and open channels. Case studies will demonstrate the importance of understanding fluid mechanics in designing water distribution systems for food production, processing, and water control within the environment.

Course Objectives

The intent of this course is to:

1. To provide a theoretical background in the area of fluid mechanics.
2. To help provide the fundamental knowledge that can be used as a basis for areas such as hydraulics, hydrology, groundwater hydrology, irrigation and drainage, biomedical engineering, and others.
3. To provide an opportunity for students to practice their critical thinking and problem-solving skills.

Course Content:

1. Introduction to Fluid Mechanics
2. Fluid properties
3. Fluid statics
4. Fluid dynamics
5. Flow in closed conduits
6. Open channel flow

Texts, Readings, Materials

Textbook(s)

Fluid Mechanics, Student Value Edition Plus Mastering Engineering with Pearson eText -- Access Card Package, 2/E Russell C. Hibbeler ISBN-13: 9780134628776

Supplementary Reading

Mastering Engineering online resource comes with the purchase of the textbook. It is a very good resource for solving additional problem assignments. Students are responsible for the content covered in the textbook and the Mastering Engineering online resource for the tests and examination. The best way to understand the material covered in this course is to work through problems at the end of the chapters for practice.

Learning Outcomes

At the conclusion of the course, the student should be able to:

1. Understand fundamental concepts of fluid properties, Fluid Statics, and fluid mechanics.
2. Have a solid understanding of the concepts of conservation of mass, momentum, and energy as it relates to fluids.
3. Understand common assumptions made when working in Fluid Mechanics.

Grading Scale

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.

Letter	Mark
A+	92–100
A	85–91
B+	78–84
B	72–77
C+	66–71
C	60–65
D	50–59
F	< 50

Graduate Attributes

KB: A knowledge base for engineering
 PA: Problem analysis
 IN: Investigation
 DE: Design
 ET: Use of engineering tools
 IT: Individual and teamwork
 CS: Communication skills
 PR: Professionalism
 IE: Impact of engineering on society/environment
 EE: Ethics and equity
 EP: Economics and project management
 LL: Life-long learning relationships.)

Accreditation Units

Mathematics: 0%
 Natural Science: 0%
 Complementary Studies: 0%
 Engineering Science: 100%
 Engineering Design: 0%

Evaluation

Component	Value (%)	Method of Feedback*	Indicators being assessed	I/T**
Tutorials	10	F, S	PA.1, PA.2, PA.3	I
Labs	8	F, S	IN.1, IN.2, IN.3	T
Online-Assignments	12	S	PA.1, PA.2, PA.3	I
Mid-term Test	10	F, S	KB.3, PA.3	I
Quiz	5	F, S	KB.3	I
Participation	5	F	PA.1, PA.2, PA.3	I
Final exam	50	F, S	KB.3, PA.3	I

* Method of Feedback: **F** - Formative (written comments and/or oral discussion), **S** - summative (numerical grade) ** I/T: **I** – Individual effort, **T** – Team effort

Expected Competency Levels

Com. Level	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1												
2			3									
3	1	2										
4												
5												
6												

Graduate Attributes Assessed

KB.3 – Recalls and defines, and/or comprehends and applies information, first principles and concepts in fundamental engineering science.
 PA.1 – Identifies and defines complex engineering problems.
 PA.2 – Develops and/or implements a strategy to analyze complex engineering problems.
 PA.3 – Analyzes and solves complex engineering problems.
 IN.1 – Gathers information (literature review, measurements, experiments, laboratory exercises) and analyzes data.
 IN.2 – Devises and/or implements an appropriate plan / methodology for gathering information required to solve a complex engineering problem.
 IN.3 – Interprets results and reaches appropriate conclusions.

Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations on Academic Integrity, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

Assignment Extensions, Late Submission Policy and Missed Tests

Deadlines are a reality in the world of engineering; we expect assignments to be completed on time to the UMLearn portal. Assignments submitted after the due date will be docked 10% per day. Assignments will not be accepted after one week from the date assigned. All assignments must be submitted to pass the course. There will be no make-up quiz or midterm test. The weight of the final exam will be adjusted to compensate for a quiz or midterm test missed for valid, documented medical or compassionate reasons.

Competency Levels (Com. Level)

- 1 - Knowledge (Able to recall information)
- 2 - Comprehension (Ability to rephrase information)
- 3 - Application (Ability to apply knowledge in a new situation)
- 4 - Analysis (Able to break problem into its components and establish relationships.)
- 5 - Synthesis (Able to combine separate elements into a whole)
- 6 - Evaluation (Able to judge the worth of something)

Important Dates

- **Early Withdrawal Deadline**
September 19, 2023
- **National Day for Truth and Reconciliation**
Mon. Oct. 2, 2023
No classes or examinations
- **Thanksgiving**
Mon. Oct. 9, 2023
No classes or examinations
- **Fall Term Break**
Nov. 13-17, 2023
No classes or examinations
- **Remembrance Day (observed)**
Mon. Nov. 13, 2023
No classes or examinations
- **Voluntary Withdrawal Deadline**
November 21, 2023
- **Last Day of Classes**
Mon. Dec. 11, 2023

Requirements/Regulations

- The Faculty of Engineering expects regular attendance of all students at lectures, laboratories, and tutorials. If the number of unexcused absences recorded against a student in any one course exceeds 10 percent of the number of course hours (including mandatory lectures, laboratories, and tutorials), the course instructor may report the case to the Dean of Engineering and inform the student of potential debarment. If the student's attendance or work continues to be unsatisfactory, the instructor has the authority to initiate procedures to debar the student from attending classes, handing in assignments, and from final examinations and/or from receiving credit. Such cases shall be reported to the Faculty Council of Engineering at the first opportunity. Students so debarred will have failed that course and will have to repeat the course in the case that the course is compulsory. (University of Manitoba General Academic Regulations 7.1 & Faculty of Engineering Academic Regulations 3.2)
- Self-Declaration forms may be completed for missed tests, exams, or assignments during short-term absences (≤ 72 hours) for extenuating circumstances. This form cannot be used for planned absences like vacations. It is also not to be used for longer-term absences, or ongoing circumstances (e.g., Authorized Withdrawals, Leaves of Absence, or other accommodations), which will still require additional documentation.

[Self-Declaration Form for Brief or Temporary Absence](#)

[Self-Declaration Policy for Brief or Temporary Absence](#)

Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e. assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the instructor and/or the department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University's *Intellectual Property Policy* and the protection of privacy provisions of *The Freedom of Information and Protection of Privacy Act (Manitoba)*. Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.

Additional Information

University regulations **prohibit the use of Smartphones** during tests/exams. Some of you may not own a proper calculator. I encourage you to purchase and learn how to use a calculator to quickly solve for the roots of equations such as: $x^3 + 5x^2 - 15 = 25$
In addition, you should be able to use the GoalSeek or Solver functions in EXCEL to solve such equations.

If you are experiencing difficulties with your studies or assignments, or have a disability or illness which may affect your course of study, you should discuss these issues with your instructor and/or one of the following Student Affairs offices as soon as possible:

Disability Services, 155 University Centre, Ph: 474-6213
Student Counseling and Career Centre, 474 University Centre, Ph: 474-8592
Learning Assistance Centre, 520 University Centre, Ph: 474-9251

Copyright Notice

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Deferred Final Examinations

Students who miss the regularly scheduled writing of a final examination for valid medical or compassionate reasons will only be allowed to write a deferred exam if the Associate Dean (Undergraduate) approves the request. All requests for a deferred examination *must* be made within 48 hours of the missed exam and follow the procedure described on the Faculty [website](#) without exception. Course Instructors *do not have the discretion* to grant deferred final examinations.

[Deferred Exam Policy \(student experience website\)](#)