

Price Faculty of Engineering

Department of Biosystems Engineering

Course Outline

Instruction Team

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

Student Hours

- Tuesdays 1:00 2:00 PM
- Individual assistance is also available by appointment.

Teaching Assistant

 Amir Sagharichi sagharia@myumanitoba.ca

Lecture 245 J.H. Ellis TR 10:00-11:15 am

Tutorial/Lab E2-320 EITC Tutorial/Lab Time: R 2:30 -4:30 pm

Contact Hours Lectures: 3 hrs x 13 weeks = 39 hrs Tutorial/Lab: 2 hrs x 13 weeks = 26 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 Anishinaabeg, Ininiwak, Anisininewuk, Dakota Oyate and Dene, and on the National Homeland of the Red River Métis.

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

Fall 2024

Course 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 Goals

The intent of this course is to:

- 1. To provide a theoretical background in the area of fluid mechanics.
- 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 problemsolving 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

Course Delivery

The Department of Biosystems Engineering has devised a plan so that there is minimal impact on the delivery and content of the course, should the instructor fall sick and be unable to continue lectures in-person. Please be assured that the alternative plan outlining any deviation from the normal mode of instruction will be communicated to you as quickly as possible if/when the need arises.

Recommended Reading

Modified MasteringEngineering for Hibbeler, Fluid Mechanics in SI Units 2nd Edition with Pearson eText -- Access Card Package, 2/E Russell C. Hibbeler ISBN-13: 9781292247304

Accreditation Details

Accreditation Units

- Mathematics: 0%
- Natural Science: 0%
- Complementary Studies: 25%
- Engineering Science: 0%
- Engineering Design: 75%

Graduate Attributes

- KB: A knowledge base for engineering
- PA: Problem analysis
- IN: Investigation
- DE: Design
- ET: Use of engineering tools
- IT: Individual and team-work
- 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
- Competency Levels

I - Introduced

- D Intermediate (Developing)
- A Advanced

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	
А	85–91	
B+	78–84	
В	72–77	
C+	66–71	
С	60–65	
D	50-59	
F	< 50	

Learning Outcomes

By the end of this course, you will be able to:

No.	Learning Outcome
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.

CEAB Graduate Attributes Assessed

This course will assess the following CEAB graduate attribute indicators shown below:

Indicator (Level)	Indicator Description	Assessment Point
KB.3 (D)	Recalls and defines, and/or comprehends and applies information, first principles and concepts in <u>fundamental engineering science</u>	Quiz, Midterm & Final Exam
PA.2 (D)	Develops and/or implements a strategy to analyze complex engineering problems	Tutorial, Online Assignments & Participation
IN.3 (I)	Interprets results and reaches appropriate conclusions	Labs

Evaluation

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

Important Dates

• Lab 1 Sept. 12, 2024

- Early Withdrawal Deadline Sept. 18, 2024
- National Day for Truth and Reconciliation Mon. Sept. 30, 2024 No classes or examinations
- Lab 2 Oct. 3, 2024
- Thanksgiving Mon. Oct. 14, 2024 No classes or examinations

• Quiz Oct. 17, 2024

• Lab 3 Oct. 24, 2024

• Midterm Test Thurs. Oct. 31, 2024

- Lab 4 Nov. 7, 2024
- Remembrance Day Mon. Nov. 11, 2024 No classes or examinations

• Fall Term Break Nov. 12-15, 2024 No classes or examinations

- Voluntary Withdrawal Deadline November 19, 2024
- Lab 5 Nov. 28, 2024
- Last Day of Classes Mon. Dec.9, 2024

Grading

Tutorials (12%): Each Thursday we will have a tutorial, which is due five days later at 4:30 pm on Tuesday. Students will lose 10% of their mark per additional late day. Once the marks of assignments are posted to UMLearn no further assignment submissions will be allowed. Students will be given questions to practice their problem-solving skills. During tutorials, students will have two hours to work on the questions, asking questions of the TA/instructor when needed. Please upload a clearly scanned .pdf file to the UMLearn site for grading.

Online Assignments (8%): Online assignments will be given on Tuesdays to supplement the tutorials to provide additional practice problems. (These will be automatically graded online.) Online assignments are due six days later at 4:30 pm on Monday.

Labs (10%): Five labs will be completed throughout the term. Students will complete the lab and write-up as a group (One write-up per group). Labs will be completed during the tutorial sessions (3 to 4 lab groups at a time). Students will leave to attend a lab session to receive a grade for the lab. Lab write-ups will be basic.

The order will be:

1. Provide all measured data in an appropriate format. (Typically summarized in an Excel Spreadsheet)

- 2. Provide sample calculations for calculated cells.
- 3. Answer all given questions in order. (Type written. Equations can be handwritten.)

All group members must sign their name, beside which should be indicated their percentage contribution to the lab. Individual lab marks will be weighted according to this percentage. The group lead should upload a scanned .pdf file on behalf of the group to the UMLearn site. Lab reports are due one week after on Thursday at 4:30 pm.

Quiz (5%): A 30-minute test worth 5% of the final mark each will be administered during the tutorial period on October 17, 2024.

Midterm (10%): A 90-minute Midterm test worth 10% of the final mark will be administered during the tutorial period on October 31, 2024.

Participation (5%): Participation will be assessed through the submission of in-class questions and reflections throughout the term. Please be prepared with a sheet of paper.

Final exam (50%): A cumulative final exam worth 50% of your grade will be administered during the final examination period.

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.

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.

Requirements/Regulations

• All email communication must conform to the Communicating with Students university policy.

Communicating with Students

- As the Instruction Team, we will do our best to respond to all emails **within 48 hours during working hours** (8:30 AM 4:30 PM Monday thru Friday). Ex. A Friday night email may not be responded to until the following Tuesday.
- 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 Absences

• It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should familiarize themselves with the University's *General Academic Regulations*.

Or General Academic Regulations

Sengineering Academic Regulations

• Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g., Academic Integrity, Respectful Behaviour, Examinations, and related matters.

• *Supplemental Resources*

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 <u>website</u> without exception. Course Instructors *do not have the discretion* to grant deferred final examinations.

O Deferred Exam Policy (student experience website)

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 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.

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