THE UNIVERSITY OF BRITISH COLUMBIA

Department of Mechanical Engineering
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MECH 386: Industrial Fluid Mechanics

University of British Columbia

Department of Mechanical Engineering

Course Instructor:

Parisa Sarmadi

Mechanical Engineering
CEME 2208
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Office hours: Mondays 12:00-15:00 (make an appointment)

Teaching Assistant(s):

Arash Nikzad, PhD candidate
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Office hours: Tuesdays 13:00-14:00

Class Meeting Time and Location

Two 1.5-hour class each week (Tuesdays and Thursdays, 17:00-18:30, CEME 1212)

Course Structure

- *Lectures (Notes are prepared and shared on Canvas)*
- *Tutorials (TA will go through examples and help students to practice what they have learnt during lectures)*
- *Computer lab for an introductory lesson to Ansys Fluent (Same time as tutorial sessions, it will be started early October)*

Learning Outcomes or Objectives:

By the end of the course it is expected that students will be able to:
- Extend what you have learned to more complicated “industrial” systems
- Obtain exposure to a broader range of fluid mechanical problems
- *Provide ability to extend to other problems*

Course Schedule and Topics

The tentative schedule is attached to this file (see page 4)

Learning Activities

Midterms
Two midterms of 1-hour duration will be given during the term. They will represent 45% of the final grade. You must pass the midterms in order to pass the course.

Quiz
One quiz of 15 minutes duration will be given during the term. It will represent 5% of the final grade.

Problem sets
After each major topic, a take-home quiz based on a problem set will be distributed.

Class Presentations
There are couple of topics, Pumps and Renewable Energies, that students contribute by providing presentations. Each team (3 students) choose a topic from defined topics and prepare a 10-15 minutes presentation (including Q&A). The presentation will be evaluated by the instructor and the teaching assistant. It will represent 10% of the final grade.

Term Project
The term project is a combination of numerical and analytical studies. Each team (3 students) will choose a topic from defined topics by instructor. The topics are on numerical simulations of fluid dynamics problem in simple geometries. Students should run the simulations, analyze the results, and discuss them within the context of the course. You should also justify the application of these simple simulations with their industrial application. Then, you will document your topic, method of solution, results, industrial application, and summary in a research paper format.
Each team will have 10-15 minuets (including Presentation and Q&A) to present a progress report on their project to their colleagues. The presentation will be evaluated by all students and the instructor.

Course Requirements/Prerequisites:

The course needs introductory knowledge of Fluid Mechanics, such as MECH 380.

Learning Materials

Lecture notes will be provided on the course website. Informational sources could be found via the following textbook:
Fluid Mechanics – Fundamentals and Applications, Yunus Cengel and John Cimbala

Assessment, Evaluation, and Grading

Term project (final report + presentation)	30 %
Assignments	10%
Midterm Exams (2)	45%
Quiz (1)	5%
Class presentations (1)	*10%*

Policies and Resources to Support Student Success

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available at https://senate.ubc.ca/policies-resources-support-student-success. Mechanical Engineering also has a Student Services Office (students@mech.ubc.ca), located in CEME 2205, where there are staff who can provide support and refer students to the appropriate resources.

Laboratory Safety

UBC Mechanical Engineering considers safety first, and continuously, in its labs, research, and other activities. Students are expected to engage in safety discussions; to ask questions to ensure they understand safety information; to comply with policies and rules; to maintain a safe workspace; and to report all accidents, incidents, and near misses immediately to their supervisor and to https://cairs.ubc.ca. Students should work with their supervisors to ensure they understand (1) the risks associated with their work and (2) how those risks are controlled.

Date	Midterms/Assignments	Lectures
SEP 3		Introduction/Review
SEP 5	Assignment 1 out	Review
SEP 10		Review
SEP 12		Non-Newtonian Fluid Mechanics
SEP 17	Assignmnet1 in/Assignment 2 out	Non-Newtonian Fluid Mechanics
SEP 19		Non-Newtonian Fluid Mechanics
SEP 24	Assignment 2 in	Turbulence
SEP 26		Pipe Flow (Turbulent)
OCT 1	Assignment 3 out	Pipe Flow (Non-Newtonian)
OCT 3		Pipe Flow (Non-Newtonian)
OCT 8		Pipe Flow (Non-Newtonian)
OCT 10	Assignment3 in	Pipe Flow (minor losses/Network)
OCT 15	**Midterm 1**	
OCT 17	Assignment 4 out	Pumps
OCT 22		Pumps
OCT 24	Students Presentations (pumps)	
OCT 29	Assignment 4 in/Assignment 5 out	Renewable
OCT 31	Students Presentations (Renewable Energy)	
NOV 5		Porous Media
NOV 7		Porous Media
NOV 12		Multiphase Flow
NOV 14	**Midterm 2**	
NOV 19	Assignment 5 in	Multiphase Flow
NOV 21		Lubrication+ Industrial Example
NOV 26	**Quiz**	Final Project Presentations
NOV 28		Final Project Presentations