

COURSE SYLLABUS



COURSE TITLE: MENG 132 – Introduction to Fluid Mechanics

CLASS SECTION:

TERM: 2023W

COURSE CREDITS: 3

DELIVERY METHOD(S): Lecture, Laboratory

Camosun College campuses are located on the traditional territories of the Lək̓ʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.

Learn more about Camosun's

The COVID-19 pandemic has presented many challenges, and Camosun College is committed to helping you safely complete your education. Following guidelines from the Provincial Health Officer, WorkSafe BC, and the B.C. Government to ensure the health and wellbeing of students and employees, Camosun College is providing you with every possible protection to keep you safe. Our measures include COVID Training for students and employees, health checks, infection control protocols including sanitization of spaces, PPE and ensuring physical distancing. For details on these precautions please follow this link: <http://camosun.ca/covid19/faq/covid-faqs-students.html>. However, if you're at all uncomfortable being on campus, please share your concerns with your Instructor. If needed, alternatives will be discussed.

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable explanation in advance, you will be removed from the course and the space offered to the next waitlisted student.

INSTRUCTOR DETAILS

NAME: Scott Li, Ph.D., P.ENG

EMAIL: lis2@camosun.ca

OFFICE: TEC 261

HOURS:

As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.

CALENDAR DESCRIPTION

PREREQUISITE(S): C in MENG 131

CO-REQUISITE(S): None

EXCLUSION(S): Only open to students in the Mechanical Engineering Technology program

A Students will explore fluid properties and fluid statics (forces on submerged planes, pressure vessels, buoyancy). Fluid dynamic theory will be examined including: laminar and turbulent flows, energy continuity and momentum equations, fluid flow measurement, friction losses, and the design of piping systems. Other topics such as forces on piping systems, aerodynamic lift and drag, and similitude will also be covered.

COURSE LEARNING OUTCOMES / OBJECTIVES

Upon successful completion of this course a student will be able to:

- Calculate forces on flat and curved surfaces under pressure (submerged and pressurized).
- Calculate the center of pressure for a variety of submerged surfaces.
- Examine if an object will be buoyant and stable while floating using methods of buoyancy and metacentric height.
- Evaluate whether fluid flow will be laminar or turbulent using the Reynolds number (circular, non-circular, filled, non-filled flow conduits).
- Examine fluids from an energy perspective and develop the continuity equations (energy, momentum and Bernoulli's).
- Apply Bernoulli's equation to a wide variety of flow situations with a focus on gaining experience with series pipeline flow.
- Calculate friction losses in pipes and fittings using the Moody Diagram, Darcy's Equation and tabulated head loss values.
- As part of case study, design a series pipe line system.
- Describe a variety of flow and pressure measurement methods.
- Calculate the forces in piping arrangements (elbows, etc.) due to static and inertial forces.
- Calculate drag and lift forces on submerged bodies.
- Examine similitude and predict the flow conditions necessary to properly establish flow conditions for objects of differing scales.

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

Applied Fluid Mechanics, 7th Ed., R.L. Mott (Required). This edition is recommended, but previous versions of the textbook will also suffice for the course.

This course is fully supported by D2L ©.

COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

WEEK or DATE RANGE	ACTIVITY or TOPIC	OTHER NOTES
1	Course overview. Introduction to fluid mechanics; review of fluid pressure and measurement; Fluid characteristics, definitions, properties and units; manometers, barometers, gauges, transducers. Ch. 1, 2	
2	Fluid pressure and measurement, capillary action and surface tension; pressure concepts review (atmospheric, absolute and gauge pressure). Ch. 3	
3	Forces on submerged objects, planes and areas. Ch. 4	
4	Buoyancy and stability: forces on non-vertical planes and curved areas, forces on submerged and floating objects; stability of floating and submerged bodies, centers of gravity and buoyancy, metacentric height, degree of stability and static stability curves. Ch. 5.	
5	Flow of fluids flow rates and the continuity equation; conservation of energy, ideal flow, Bernoulli's Equation; grade lines (energy line, hydraulic grade line. Ch. 6	
6	The General Energy Equation General Energy Equation and applications; Power (Pumps and fluid motors); friction loss. Ch. 7 Midterm Review	
7	Reading Week No Class	
8	Midterm Exam (2 hrs) Date, Time, Location: Pending	
9	Reynold's number, Laminar and turbulent flow, and Energy Losses due to Friction. Ch. 8	
10	Velocity profiles, design velocities and flow rates. Friction loss equations, Darcy's Equation, Hagen-Poiseuille Equation, friction factors; relative roughness; Moody Diagram. Noncircular sections (Hydraulic Radius). Ch. 9	
11	Minor Losses Ch. 10	
12	Minor Losses Ch. 10 Series Pipeline Systems Ch.11	
13	Lift & drag forces on submerged surfaces, pressure drag, friction drag, induced drag, compressibility effects. Ch. 17	
14	Final Review	
15	Final Exam	

Students registered with the Centre for Accessible Learning (CAL) who complete quizzes, tests, and exams with academic accommodations have booking procedures and deadlines with CAL where advanced noticed is required. Deadlines scan be reviewed on the [CAL exams page](http://camosun.ca/services/accessible-learning/exams.html). <http://camosun.ca/services/accessible-learning/exams.html>

EVALUATION OF LEARNING

DESCRIPTION	WEIGHTING
Assignments	20%
Lab Logbook	10%
Lab Report	15%
Midterm Exam	20%
Final Exam	35%
	TOTAL
	100%

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the [Grade Review and Appeals](http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf) policy for more information.
<http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf>

COURSE GUIDELINES & EXPECTATIONS

N/A

SCHOOL OR DEPARTMENTAL INFORMATION

N/A

STUDENT RESPONSIBILITY

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

SUPPORTS AND SERVICES FOR STUDENTS

Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit <http://camosun.ca/students/>.

Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/
Learning Skills	http://camosun.ca/learningskills
Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the [Centre for Accessible Learning](http://camosun.ca/services/accessible-learning/) (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started:

<http://camosun.ca/services/accessible-learning/>

Academic Integrity

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf> for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

Academic Progress

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf> for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

Course Withdrawals Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf> for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit <http://camosun.ca/learn/fees/#deadlines>.

Grading Policy

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf> for further details about grading.

Grade Review and Appeals

Please visit <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf> for policy relating to requests for review and appeal of grades.

Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the "Attendance" section under "Registration Policies and Procedures" (<http://camosun.ca/learn/calendar/current/procedures.html>) and the Grading Policy at <http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf>.

Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf> to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun's Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student's right to choose what is right for them. For more information see Camosun's Sexualized Violence and Misconduct Policy: <http://camosun.ca/about/policies/education-academic/e-2-student-services->

and-support/e-2.9.pdf and camosun.ca/sexual-violence. To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-3703841

Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College's Student Misconduct Policy at <http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf> to understand the College's expectations of academic integrity and student behavioural conduct.

Changes to this syllabus: Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.