



CAMOSUN COLLEGE
School of Trades & Technology
Department Mechanical Engineering

MECH 176
Fluid Dynamics
Winter 2021

COURSE OUTLINE

The calendar description is available on the web @

<http://camosun.ca/learn/school/trades-technology/technology-programs.html>

Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.

1. Instructor Information

(a) Instructor	Sam Behfarshad
(b) Office hours	Tuesday. and Thursday. 11:30am-12:20pm,
(c) Location	Interurban Campus
(d) Phone	250-370-4445 Alternative:
(e) E-mail	behfarshadg@camosun.bc.ca

2. Intended Learning Outcomes

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

1. Explain fundamental fluid properties.
2. Understand and correctly use fluid dynamics terminology.
3. Define the concepts of hydrostatic fluid pressure, pressure measurement devices, and fluid buoyancy and stability.
4. Develop the general fluid dynamics equation, conservations of mass and energy.
5. Understand the effects of fluid viscosity and different types of fluid flows.
6. Analyze basic fluid energy, and different energy losses in pipe flows.
7. Understand basics of hydraulic systems, work and power in fluid power systems.
8. Define the concepts of cavitation, hydraulic pumps/motors and their selection criteria.

3. Required Materials

Textbook: Applied Fluid Mechanics, By: Robert L. Mott; Joseph A. Untener, 7th Ed.,
Publisher: Pearson, 2015.

4. Course Content and Schedule

Introduction to Fluid Dynamics: Concept of fluid, Dimensions, Standard units and conversions, Basic fluid properties, Compressibility, Pressure, Viscosity, Temperature

Pressure Distribution in a Fluids: Pressure and Pressure gradient, Hydrostatic pressure distribution, Application of Barometer/Manometry, Hydrostatic forces on plane surfaces, Hydrostatic forces on Curved surface, Hydrostatic forces on layered fluids, Buoyancy and Stability, Pressure distribution in rigid-body motion, Pressure measurements

Basic Laws of Fluid Dynamics: Conservation of mass, Continuity equation, Flow rates, Frictionless flow, The Bernoulli's equation, Torricelli's theorem, Conservation of energy, General Energy Equation

Viscous Flow in Ducts: Fluid viscosity, Reynolds number regimes, Internal versus external flows, Head loss, Friction factor, Laminar fully developed pipe flow, Turbulent pipe flow, Minor or local losses in pipe system, Flow measurement

Hydraulics: Basics and benefits, Hydraulic components and symbols, Fluid power standards, Hydraulic schematics, Work and power, Power in fluid power system

Hydraulic Pumps/motors: Types of pumps, Pump efficiencies, Cavitation, Pump selection criteria, Types of motors, Motor efficiencies, Motor selection criteria

Control Valves: Pressure control valves, Directional control valves (DCV,) Flow control valves

Ancillary Devices: Fluids, Reservoirs, Accumulators, Filters, Seals, etc.

Course Schedule and Office Hours:

Lectures :

Mon- 12:30- 14:20 pm,
Tue- 14:00– 16:00 pm,
Wed- 13:30- 14:20 pm

Lab/Tutorials:

Thu - 9:30-11:20am,

More Office Hours: By appointment.

Mid-term exam: Tuesday, Feb. 23 (2:00-4:00pm)

5. Basis of Student Assessment (Weighting)

(a) Quizzes 15%

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|-----|---------------|-----|
| (b) | Assignments | 10% |
| (c) | Lab reports | 10% |
| (d) | Mid-term Exam | 30% |
| (e) | Final Exam | 35% |

Note: The final exam must be successfully completed (mark≥50%) for a passing grade in the course.

6. Grading System

(If any changes are made to this part, then the Approved Course description must also be changed and sent through the approval process.)

(Mark with "X" in box below to show appropriate approved grading system – see last page of this template.)

Standard Grading System (GPA)

Competency Based Grading System

7. Recommended Materials to Assist Students to Succeed Throughout the Course

Lecture notes, textbook and solving problems at the end of each chapters.

8. College Supports, Services and Policies



Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ <http://camosun.ca/about/mental-health/emergency.html> or <http://camosun.ca/services/sexual-violence/get-support.html#urgent>

College Services

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at <http://camosun.ca/>

College Policies

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at <http://camosun.ca/about/policies/>. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

A. GRADING SYSTEMS <http://www.camosun.bc.ca/policies/policies.php>

The following two grading systems are used at Camosun College:

1. Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://www.camosun.bc.ca/policies/E-1.5.pdf> for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete</i> : A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.

IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.