

COURSE SYLLABUS



COURSE TITLE: Fluid Power 2 (MECH 145)
CLASS SECTION: X01
TERM: W 2023
COURSE CREDITS: 4
DELIVERY METHOD(S): In person

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 [Territorial Acknowledgement](#).

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: Murray Love
EMAIL: lovem@camosun.ca
OFFICE: TEC 215
HOURS: Monday 1130 – 1230
Tuesday 1230 – 1330
Wednesday 1130 – 1230

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

This course provides the foundation for the application of hydraulic theory by Weapon Engineering (WEng) System Maintainer. Topics include principles of fluid power and pneumatics, as well as support material for the operation, construction, function and troubleshooting of standard and electro-hydraulic systems.

COURSE LEARNING OUTCOMES / OBJECTIVES

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

- Explain basic hydraulic and pneumatic principles
- Determine flow/pressure in series/parallel circuits
- Construction and operate advanced pump controls
- Describe safety with respect to hydraulic and pneumatic systems
- Explain hydrostatic transmission principles
- Describe electro-hydraulic components and systems
- Describe aspects of electro-hydraulic servo and proportional systems
- Perform electro-hydraulic circuit troubleshooting
- Design and build basic fluid power circuits using industry standard symbols for manual, pneumatic, and PLC controlled & electrically-operated pneumatic and hydraulic systems
- Solve problems for flow and pressure, relating to pneumatic and hydraulic systems.
- Identify and describe components used in pneumatic and hydraulic systems
- Select suitable fluids for power transmission and the correct type and size of conductors for pneumatic and hydraulic systems.

- Select the correct pump or compressor (including receiver) and power source for pneumatic and hydraulic systems.
- Specify linear or rotary actuators based on force or torque, speed, fluid volumetric flow rate and pressure requirements
- Specify the operation and control of flow, pressure, and directional control valves for pneumatic and hydraulic systems
- Identify and draw graphic symbols of various components of pneumatic and hydraulic systems

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

No textbook required but the following text will be beneficial:

Fluid Power Technology, F. Don Norvelle, 1994, West Publishing Company

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	LAB	ASSIGNMENT	ACTIVITY or TOPIC
1 Jan 9 – 13	-	-	Course Information. Fluid Mechanics background review
2 Jan 16 – 20	Lab 1	Assignment 1	Basic Hydraulic Principles
3 Jan 23 – 27	Lab 2	-	Hydraulic Fluids, Hydraulic Pumps: Pump characteristics, types of pumps, positive-displacement pump, pump efficiencies etc.
4 Jan 30 – Feb 3	Lab 3	Assignment 2	Hydraulic Actuators: Hydraulic cylinders, hydraulic motors. Actuator selection and calculations.
5 Feb 6 – 10	-	Assignment 3	Hydraulic Valves: directional, pressure, flow control valves. proportional valves, servo valves etc.
6 Feb 13 – 17	Lab 4	-	Basic Hydraulic Circuit Analysis. Energy-saving design – pressure-compressed and load-sensing
7 Feb 20 – 24	-	-	<i>Reading Break – No Classes (Midterm Exam Prep)</i>
8 Feb 27 – Mar 3	Lab 5	-	Midterm Review and Midterm Exam
9 Mar 6 – 10	Lab 6	Assignment 4	Explain basic pneumatic principles Basic Pneumatic Circuits: Simple Fluid Power Control Pneumatic Systems and Gas Laws, Air Flow Measurement (scfm); Fluid Power Schematic Drawings
10 Mar 13 – 17	Lab 7	Assignment 5	Introduction to Programmable Logic Controllers (PLC's) PLC's and Ladder Logic Diagram PLC Sensors and Valve Actuators in Pneumatics Advanced PLC Commands and Features
11 Mar 20 – 24	Lab 8	-	Pneumatic Components; Basic Pneumatic Circuits; Pneumatic Circuit Layout. Variations of Pneumatic Logic Control

WEEK or DATE RANGE	LAB	ASSIGNMENT	ACTIVITY or TOPIC
12 Mar 27 – 31	Lab 9	Assignment 6	Pneumatic Components (cont.); Basic Pneumatic Circuits (cont.); Pneumatic Timing Circuits. Variations of Pneumatic Logic Control (cont.)
13 Apr 3 – 7	Lab 10		Good Friday - Pneumatic Circuit Layout (cont.), Valve Sizing, Flow Section, Valves in Parallel Connection Air Line Friction Losses.
14 Apr 10 – 14	Lab 11		Final Exam Review
15 Apr 17 – 21	-		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 notice is required. Deadlines can 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
Lab(s)	20%
Assignments	20%
Midterm	25%
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>

Lab reports and assignments are to be handed in when due and must be completed to the instructor's satisfaction prior to sitting the final exam.

The final exam must be successfully completed (mark $\geq 50\%$) for a passing grade in the course.

LAB REPORTS

Formal Lab Reports are expected for some labs. The Lab Reports and/or Lab simulation files are due one week after the lab period. There will be one Lab Report for each group. No late Lab Reports will be accepted.

ASSIGNMENTS

Assignments are required to be submitted to the Dropbox on D2L (Assignments) before due. Late assignments will be counted for course completion but no marks will be awarded.

SCHOOL OR DEPARTMENTAL INFORMATION

Please refer to the following web site for Camosun School of Trades and Technology <https://camosun.ca/programs-courses/school-trades-technology>

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/>.

Support Service	Website
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](#) (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.