COURSE SYLLABUS

COURSE TITLE: MATH-191: Applied Math for Civil/Mech 1

CLASS SECTION: X01

TERM: 2023 Winter

COURSE CREDITS: 3

DELIVERY METHOD(S): Interurban Campus

Camosun College campuses are located on the traditional territories of the Ləḱʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.
Learn more about Camosun's Territorial Acknowledgement.

For COVID-19 information please visit https://legacy.camosun.ca/covid19/index.html.

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: Raymond Lai **OFFICE:** CBA 152

EMAIL: lai@camosun.ca **PHONE:** 250-370-4491

HOURS: Tuesday 11:30am – 12:20pm, Wednesday 1:30pm – 4:20pm, and by appointment

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

Students will be introduced to the topics in introductory calculus and matrix algebra necessary to achieve competency in civil and mechanical engineering technology. In calculus, students will study limits; differentiation of algebraic, trigonometric, logarithmic and exponential functions; applications of derivatives; indefinite and definite integrals; and applications of integrals. Students will also learn about matrix operations, matrix inverses, and solving 2x2 and 3x3 linear systems using a variety of methods. Applications to civil and mechanical engineering are included throughout the course.

PREREQUISITE(S):	CO-REQUISITE(S):	EXCLUSION(S):
One of: • C+ in Pre-calculus 12 • C+ in MATH 097 • C in MATH 107 • C in MATH 115	Not Applicable	Not Applicable

COURSE LEARNING OUTCOMES / OBJECTIVES

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

1. Evaluate limits of functions. Using the limit definition, find derivatives of simple algebraic functions. Use derivatives to determine the slope of the tangent line to a curve, velocity, acceleration, and rates of change.
2. Use the power, product, quotient and chain rules to differentiate algebraic, trigonometric, logarithmic and exponential functions. Use implicit differentiation.
3. Find tangents and normals to given functions. Use Newton's Method to find an approximate solution to an equation. Solve problems involving related rates, curve sketching, maxima and minima, and parametrically defined curves.   Find differentials, estimate errors, and linearize functions.
4. Find antiderivatives of functions and evaluate both indefinite and definite integrals. Use the trapezoidal rule and Simpson's Rule to approximate a definite integral.
5. Use integration to solve applications problems including the area between curves, volumes of solids of revolution, and centroids.
6. Calculate determinants of 2x2 and 3x3 matrices. Add, subtract and multiply matrices. Calculate the inverse of a matrix. Solve 2x2 and 3x3 linear systems using Gauss-Jordan elimination, augmented matrices and inverse matrices.

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

(a)   Course notes (accessible from the course D2L site)

(b)   Optional Reference: Allyn J. Washington, Basic Technical Mathematics with Calculus, SI Version, 11th Ed.
(If you purchase an etext from our bookstore, use the course ID lai06439 to gain access.)
Copies available at the library.

(c)   Other: Scientific Calculator (EL-W516 strongly recommended; Graphing Calculators are not permitted.)

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	
Week 1 (1/9 – 1/13)	Section 1 Limits [~ 2.5 to 3 hours]	The Derivative
	Section 2 Slope of a Tangent to a Curve [~ 1 hour]	
	Section 3 The Derivative [~ 1 hour]	

WEEK or DATE RANGE	ACTIVITY or TOPIC	
Week 2 (1/16 – 1/20)	Section 4 Derivatives of Polynomials [~ 1 hour]	The Derivative (Continued)
	Section 5 Derivatives as an Instantaneous Rate of Change [~ 0.5 to 1 hour]	
	Section 6 Higher Derivatives [~ 0.5 to 1 hour]	
	Section 7 Derivatives of Products and Quotients [~ 2 hours]	
	Section 8 Derivatives of Powers of Functions & Chain Rule [~ 1.5 to 2 hours]	
Week 3 (1/23 – 1/27) Week 4 (1/30 – 2/3)	Section 8 (Continud)	
	Section 9 Derivatives of Implicit Functions [~ 0.5 to 1 hour]	
	Section 10 Tangents and Normals [~ 1 hour]	Applications of the Derivative
	Section 11 Newton's Method for Solving Equations [~ 1 hour]	
	Section 12 Curvilinear Motion [~ 1 hour]	
	Study Sessions to prepare for Test 1: sections 1 – 12 (tentatively on 1/31)	
	Section 13 Related Rates [~ 2.5 to 3 hours]	
	Section 14 Using Derivatives in Curve Sketching [~ 2 hours]	
Week 5 (2/6 – 2/10)	Section 14 (Continued)	
	Section 15 Applied Max/Min Problems [~ 2 hours]	
	Section 16 Linear Approximations [~ 1.5 to 2 hours]	
	Section 17 Derivatives of Sine and Cosine Functions [~ 1.5 to 2 hours]	Transcendental Functions
Week 6 (2/13 – 2/17)	Section 17 (Continued)	
	Section 18 Derivatives of the Other Trigonometric Functions [~ 1 hour]	
	Section 19 Derivatives of the Inverse Trigonometric Functions [~ 1 hour]	
	Study Sessions to prepare for Test 2: sections 13 – 19 (tentatively on 2/27)	
Week 7 (2/20 – 2/24)	Family Day and Reading Break (College Closed)	
Week 8 (2/27 – 3/3)	Section 20 Derivatives of Logarithmic Functions [~ 1.5 to 2 hours]	
	Section 21 Derivatives of Exponential Functions [~ 0.5 to 1 hour]	
	Section 22 Applications of Derivative [~ 1 hour]	

WEEK or DATE RANGE	ACTIVITY or TOPIC	
Week 9 (3/6 – 3/10)	Section 23 Antiderivatives and Indefinite Integral [~ 2 hours]	Integration and its Applications
	Section 24 Applications of the Indefinite Integral [~ 1 hour]	
	Section 25 Definite Integral [~ 0.75 hour]	
	Section 26 Areas by Integration [~ 2 hours]	
Week 10 (3/13 – 3/17)	Section 26 (Continued)	
	Section 27 Volumes by Integration [~ 1 hour]	
	Section 28 Centroids (2-dimensional and constant density only) [~ 1 hour]	
	Section 29 Other Applications of Definite Integrals [~ 1.5 to 2 hours]	
Week 11 (3/20 – 3/24)	Section 29 (Continued)	
	Section 30 Numerical Integration: Trapezoidal Rule [~ 0.75 hour]	
	Section 31 Numerical Integration: Simpson's Rule [~ 0.5 hour]	
	Section 32 Introduction to Matrices: Definitions and Basic Operations [~ 0.5 to 1 hour]	Matrices & Systems of Linear Equations
	Study Sessions to prepare for Test 3: sections 20 – 29 (tentatively on 3/27)	
Week 12 (3/27 – 3/31)	Section 33 Matrix Multiplication [~ 1.5 to 2 hours]	
	Section 34 Matrix Inverses [~ 1.5 to 2 hours]	
	Section 35 Matrices and Linear Equations [~ 0.5 to 1 hour]	
Week 13 (4/3 – 4/7)	Section 36 Gaussian Elimination and Gauss Jordan Elimination [~ 2 hours]	
	Study Sessions to prepare for Test 4: sections 30 –36 (tentatively on 4/11)	
	Good Friday (College Closed)	
Week 14 (4/10 – 4/14)	Easter Monday (College Closed)	
	Study Sessions to prepare Comprehensive Final Exam	
Apr 17 – Apr 25	Final Exam **(Plan your travel and book your flights wisely)**	

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

DESCRIPTION	WEIGHTING			
	(a) No Final Exam [only if you get at least 50% in each term test]		(b) With Final Exam	
Term Test 1	30%	100% Term Tests	18%	60% Term Tests
Term Test 2	24%		14.4%	
Term Test 3	28%		16.8%	
Term Test 4	18%		10.8%	
Final Exam	████████████████████████		40% Final Exam	
TOTAL	100%			

If your performance on each term test is at least 50%, you do not need to write the comprehensive final exam and your course grade can be determined 100% by your performances on the term tests using weighting (a); otherwise, your course grade will be calculated using weighting (b).

Note:

- There is no makeup for missed test (except for documented medical reasons).
- If you plan to use this course to fulfill the pre-requisite requirement (letter grade C, that is 60%) for Math 193, your term work performance (calculated using weighting (a)) must be at least 33.3%. Please check the College Website for the most updated information.
- Regardless of what your term mark is, you can opt in to write the comprehensive final examination (by signing up in the "Opt in" quiz in D2L – details to be released in D2L after test 4) and your course grade will then be calculated using weighting (b).
- Once you submit your final decision of writing the final examination, your course grade will be calculated using weighting (b), and you cannot go back to use 100% term work using weighting (a).
- You can get a better grade or a worse course grade depending on whether your performance in the final examination is better or worse than that in the term.
  For instance:

	Term Tests	Final Exam	Course
Student 1	80% (A-)	Do Not Write	80% (A-)
Student 2	80% (A-)	(Opt in to write) 95%	$0.6(80\%) + 0.4(95\%) = 86\%$ (A)
Student 3	80% (A-)	(Opt in to write) 75%	78% (B+)
Student 4	55% (D)	(Opt in to write) 70%	61% (C)
Student 5	55% (D)	(Opt in to write) 50%	53% (D)

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 policy for more information.
http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf

SCHOOL OR DEPARTMENTAL INFORMATION

Interurban Math Lab (TEC 142)
    Services: Individual free tutoring and study space
    Schedule: posted on the door
    Format: Drop in – first-come first-served

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 (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.