

# COURSE SYLLABUS



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

**CLASS SECTION:** X01

**TERM:** 2024 Winter

**COURSE CREDITS:** 3

**DELIVERY METHOD(S):** Interurban Campus

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

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## INSTRUCTOR DETAILS

**NAME:** Raymond Lai

**OFFICE:** CBA 152

**EMAIL:** lai@camosun.ca

**PHONE:** 250-370-4491

**OFFICE HOURS:** Tuesday and Wednesday 10:30am – 11:20am, Thursday 9:30am – 10:20am, Friday 10:30am – 11:20am, 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.*

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## 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: <ul style="list-style-type: none"><li>• C+ in Pre-calculus 12</li><li>• C+ in MATH 097</li><li>• C in MATH 107</li><li>• C in MATH 115</li></ul>	Not Applicable	Not Applicable

## COURSE LEARNING OUTCOMES / OBJECTIVES

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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

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- (a) Course notes (accessible from the course D2L site)
- (b) Optional Reference: Allyn J. Washington, Basic Technical Mathematics with Calculus, SI Version, 11<sup>th</sup> Ed. (If you purchase an etext from our bookstore, use the course ID lai86603 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

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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 (1/8 – 1/12)	Section 1.1 Limits [~ 2.5 to 3 hours]	The Derivati
	Section 1.2 Slope of a Tangent to a Curve and the Derivative [~ 2 hours]	

WEEK or DATE RANGE	ACTIVITY or TOPIC	
Week 2 (1/15 – 1/19)	Section 1.3 Derivatives of Polynomials [~ 1 hour]	The Derivative (Continued)
	Section 1.4 Derivatives as an Instantaneous Rate of Change and Higher Derivatives [~ 1 to 2 hours]	
	Section 1.5 Derivatives of Products and Quotients [~ 2 hours]	
	Section 1.6 Derivatives of Powers of Functions & Chain Rule [~ 1.5 to 2 hours]	
Week 3 (1/22 – 1/26)	Section 1.6 (Continued)	Applications of the Derivative
	Section 1.7 Derivatives of Implicit Functions [~ 0.5 to 1 hour]	
	Section 2.8 Tangents and Normals [~ 1 hour]	
	Section 2.9 Newton's Method for Solving Equations [~ 1 hour]	
	Study Sessions to prepare for Test 1: sections 1.1 – 2.9 ( <b>tentatively on 1/29</b> )	
Week 4 (1/29 – 2/2)	Test 1: sections 1.1 – 2.9 ( <b>tentatively on 1/29</b> )	Applications of the Derivative
	Section 2.10 Curvilinear Motion [~ 1 hour]	
	Section 2.11 Related Rates [~ 2.5 to 3 hours]	
	Section 2.12 Using Derivatives in Curve Sketching [~ 2 hours]	
Week 5 (2/5 – 2/9)	Section 2.12 (Continued)	Applications of the Derivative
	Section 2.13 Applied Max/Min Problems [~ 2 hours]	
	Section 2.14 Linear Approximations [~ 1.5 to 2 hours]	
Week 6 (2/12 – 2/16)	Section 3.15 Derivatives of Sine and Cosine Functions [~ 1.5 to 2 hours]	Transcendental Functions
	Section 3.15 (Continued)	
	Section 3.16 Derivatives of Tangent, Cotangent, Secant and Cosecant Functions [~ 1 hour]	
	Section 3.17 Derivatives of the Inverse Trigonometric Functions [~ 1 hour]	
Week 7 (2/19 – 2/23)	Study Sessions to prepare for Test 2: sections 2.10 – 3.17 ( <b>tentatively on 2/26</b> )	Transcendental Functions
	Family Day and Reading Break (College Closed)	
Week 8 (2/26 – 3/1)	Test 2: sections 2.10 – 3.17 ( <b>tentatively on 2/26</b> )	Transcendental Functions
	Section 3.18 Derivatives of Logarithmic Functions [~ 1.5 to 2 hours]	
	Section 3.19 Derivatives of Exponential Functions [~ 0.5 to 1 hour]	
	Section 3.20 Applications of Derivative [~ 1 hour]	

WEEK or DATE RANGE	ACTIVITY or TOPIC	
Week 9 (3/4 – 3/8)	Section 4.21 Antiderivatives and Indefinite Integral [~ 2 hours]	Integration and its Applications
	Section 4.22 Applications of the Indefinite Integral [~ 1 hour]	
	Section 4.23 Definite Integral [~ 0.75 hour]	
	Section 4.24 Areas by Integration [~ 2 hours]	
Week 10 (3/11 – 3/15)	Section 4.24 (Continued)	
	Section 4.25 Volumes by Integration [~ 1 hour]	
	Study Sessions to prepare for Test 3: sections 3.18 – 4.25 <b>(tentatively on 3/18)</b>	
Week 11 (3/18 – 3/22)	Test 3: sections 3.18 – 4.25 <b>(tentatively on 3/18)</b>	
	Section 4.26 Centroids (2-dimensional and constant density only) [~ 1 hour]	
	Section 4.27 Other Applications of Definite Integrals [~ 1.5 to 2 hours]	
	Section 4.28 Numerical Integration: Trapezoidal Rule [~ 0.75 hour]	
	Section 4.29 Numerical Integration: Simpson’s Rule [~ 0.5 hour]	
Week 12 (3/25 – 3/29)	Section 5.30 Introduction to Matrices: Definitions and Basic Operations [~ 0.5 to 1 hour]	Matrices & Systems of Linear Equations
	Section 5.31 Matrix Multiplication [~ 1.5 to 2 hours]	
	Section 5.32 Matrix Inverses [~ 1.5 to 2 hours]	
	Good Friday (College Closed)	
Week 13 (4/1 – 4/5)	Easter Monday (College Closed)	
	Section 5.33 Matrices and Linear Equations [~ 0.5 to 1 hour]	
	Section 5.34 Gaussian Elimination and Gauss Jordan Elimination [~ 2 hours]	
	Study Sessions to prepare for Test 4: sections 4.26 –5.34 <b>(tentatively on 4/8)</b>	
Week 14 (4/8 – 4/12)	Test 4: sections 4.26 –5.34 <b>(tentatively on 4/8)</b>	
	Study for other final exams	
Apr 15 – Apr 23	Final Exam Period <b>(Plan your travel and book your flights wisely)</b>	

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

WEIGHTS (DATES)	Assignments	Term Tests
Assignment/Test 1	5% (due in class Thursday Jan 25)	20% (Monday Jan 29)
Assignment/Test 2	5% (due in class Thursday Feb 15)	20% (Monday Feb 26)
Assignment/Test 3	5% (due in class Thursday Mar 14)	20% (Monday Mar 18)
Assignment/Test 4	5% (due in class Thursday Apr 4)	20% (Monday Apr 8)
TOTAL	100%	

Notes:

- Assignment solutions will be posted in D2L soon after the due time, hence late assignments will not earn credits.
- If you plan to use this course to fulfill the pre-requisite requirement for Math 193, you need 60% (letter grade C) in this course. Please check the College Website for the most updated information.

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>

## SCHOOL OR DEPARTMENTAL INFORMATION

Interurban Math Lab (TEC 142) – 370-4492

Services: Individual free tutoring and study space

Schedule: posted on the door

Format: Drop in – first-come first-served

## STUDENT RESPONSIBILITY

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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

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

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.

### 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](http://camosun.ca/sexual-violence). To contact the Office of Student Support: [oss@camosun.ca](mailto: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.