

# COURSE SYLLABUS



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

CLASS SECTION: BX02

TERM: 2021 Fall

COURSE CREDITS: 4

DELIVERY METHOD(S): Interurban blended

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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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

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NAME: Raymond Lai

EMAIL: [lai@camosun.bc.ca](mailto:lai@camosun.bc.ca)

PHONE: 250-370-4491

OFFICE: CBA 152

HOURS: Monday 1:30 pm – 2:20 pm, Tuesday 12:30pm – 3:20pm, 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

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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  $2 \times 2$  and  $3 \times 3$  matrices. Add, subtract and multiply matrices. Calculate the inverse of a matrix. Solve  $2 \times 2$  and  $3 \times 3$  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 lai72935 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<br>(9/7 – 9/10)  | 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 2<br>(9/13 – 9/17) | Section 4 Derivatives of Polynomials [~ 1 hour]                            |                |
|                         | 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]                |                |

| WEEK or DATE RANGE         | ACTIVITY or TOPIC   |                                |
|----------------------------|---|--------------------------------|
| Week 3<br>(9/20 – 9/24)    | Section 8 Derivatives of Powers of Functions & Chain Rule [~ 1.5 to 2 hours]            | Applications of the Derivative |
|                            | Section 9 Derivatives of Implicit Functions [~ 0.5 to 1 hour]                           |                                |
|                            | Section 10 Tangents and Normals [~ 1 hour]  |                                |
| Week 4<br>(9/27 – 10/1)    | Section 11 Newton's Method for Solving Equations [~ 1 hour]                             | Applications of the Derivative |
|                            | Section 12 Curvilinear Motion [~ 1 hour]  |                                |
| Week 5<br>(10/4 – 10/8)    | Section 13 Related Rates [~ 2.5 to 3 hours]   | Applications of the Derivative |
|                            | Section 14 Using Derivatives in Curve Sketching [~ 2 hours]                             |                                |
| Week 6<br>(10/12 – 10/15)  | Section 15 Applied Max/Min Problems [~ 2 hours]   | Applications of the Derivative |
|                            | Section 16 Linear Approximations [~ 1.5 to 2 hours]                                     |                                |
| Week 7<br>(10/18 – 10/22)  | Section 17 Derivatives of Sine and Cosine Functions [~ 1.5 to 2 hours]                  | Transcendental Functions       |
|                            | Section 18 Derivatives of the Other Trigonometric Functions [~ 1 hour]                  |                                |
|                            | Section 19 Derivatives of the Inverse Trigonometric Functions [~ 1 hour]                |                                |
| Week 8<br>(10/25 – 10/29)  | Section 20 Derivatives of Logarithmic Functions [~ 1.5 to 2 hours]                      | Transcendental Functions       |
|                            | Section 21 Derivatives of Exponential Functions [~ 0.5 to 1 hour]                       |                                |
|                            | Section 22 Applications of Derivative [~ 1 hour]  |                                |
| Week 9<br>(11/1 – 11/5)    | Section 23 Antiderivatives [~ 0.5 hour]   | Integration                    |
|                            | Section 24 Indefinite Integral [~ 1 hour]   |                                |
|                            | Section 25 Area under a Curve [~ 0.5 hour]  |                                |
|                            | Section 26 Definite Integral [~ 0.75 hour]  |                                |
| Week 10<br>(11/8 – 11/12)  | Section 27 Numerical Integration: Trapezoidal Rule [~ 0.75 hour]                        | Integration                    |
|                            | Section 28 Numerical Integration: Simpson's Rule [~ 0.5 hour]                           |                                |
|                            | Section 29 Applications of the Indefinite Integral [~ 1 hour]                           |                                |
| Week 11<br>(11/15 – 11/19) | Section 30 Areas by Integration [~ 1 to 1.5 hours]                                      | Applications of Integration    |
|                            | Section 31 Volumes by Integration [~ 1 hour]  |                                |
|                            | Section 32 Centroids (2-dimensional only) [~ 1 hour]                                    |                                |
| Week 11<br>(11/15 – 11/19) | Section 33 Other Applications of Definite Integrals [~ 1.5 to 2 hours]                  | Applications of Integration    |
|                            | Section 34 Introduction to Matrices: Definitions and Basic Operations [~ 0.5 to 1 hour] |                                |

| WEEK or DATE RANGE         | ACTIVITY or TOPIC  |   |
|----------------------------|--|---|
| Week 12<br>(11/22 – 11/26) | Section 35 Matrix Multiplication [~ 1.5 to 2 hours]                      | Matrices & Systems<br>of Linear Equations |
|                            | Section 36 Matrix Inverses [~ 1.5 to 2 hours]                            |   |
| Week 13<br>(11/29 – 12/3)  | Section 37 Matrices and Linear Equations [~ 0.5 to 1 hour]               |   |
|                            | Section 38 Gaussian Elimination and Gauss Jordan Elimination [~ 2 hours] |   |
| Week 14<br>(12/6 – 12/10)  | Study for the comprehensive 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

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| DESCRIPTION   | WEIGHTING   |
|---|-------------|
| Test 1: sections 1 – 9 (Tentative Date: Tuesday Sept 28 <sup>th</sup> )                                 | 15%         |
| Test 2: sections 10 – 19 (Tentative Date Tuesday Nov 2 <sup>nd</sup> )                                  | 18%         |
| Test 3: sections 20 – 32 (Tentative Date Tuesday Nov 23 <sup>rd</sup> )                                 | 17%         |
| Test 4: sections 33 – 38 (Tentative Date Tuesday Dec 7 <sup>th</sup> )                                  | 10%         |
| Final Exam<br>(This will take place during the period of Dec 13 <sup>th</sup> to Dec 21 <sup>st</sup> ) | 40%         |
| <b>TOTAL</b>  | <b>100%</b> |

There is no makeup for missed test (except for documented medical reasons).

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

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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

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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.