

# COURSE SYLLABUS



COURSE TITLE: MATH-252: Applied Differential Equations

CLASS SECTION: X01, X02

TERM: 2023 Fall

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: Monday 10:30am – 11:20am and 12:30am – 1:20pm,  
Wednesday 2:30pm – 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.*

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## CALENDAR DESCRIPTION

This first course in differential equations includes solving and modeling with first-order differential equations, solving and modeling with linear differential equations of higher order including applications such as spring-mass systems, finding series solutions of linear differential equations, using Laplace transforms to solve linear initial value problems, and solving systems of linear differential equations. Applications to engineering are provided throughout the course.

PREREQUISITE(S):	CO-REQUISITE(S):	EXCLUSION(S):
Restricted to students in Engineering Bridge All of <ul style="list-style-type: none"><li>● C in MATH 250A</li><li>● C in MATH 251</li></ul>	Not Applicable	Not Applicable

## COURSE LEARNING OUTCOMES / OBJECTIVES

Upon completion of this course students will be able to:

1. Solve various types of first-order differential equations (DEs): separable, linear, exact, nth-degree homogeneous, and Bernoulli.
2. Solve higher-order linear DEs using a variety of techniques including reduction of order, variation of parameters, and undetermined coefficients.
3. Model real-life phenomenon with DEs, including exponential growth and decay, falling bodies with and without air resistance, LCR circuits, and mass-spring systems.
4. Find a power series solution for a linear DE.
5. Use a Laplace transform and its properties to solve a linear IVP.
6. Solve systems of linear DEs using matrices.

## REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

- (a) Texts: (Optional Reference) Dennis G. Zill, A First Course in Differential Equations with Modeling Applications, 11th Edition, Brooks/Cole.
- (b) Other: Non-graphing non-programmable scientific calculator

## 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 (9/4 – 9/8)	(9/4) Labor Day (College Closed)	Power Series Solution
	Section 1.1 Power Series Solutions about Ordinary Points	
Week 2 (9/11 – 9/15)	Section 2.2 First-Order Separable Differential Equations	First Order Differential Equation and Modeling
	Section 2.3 First-Order Linear Differential Equations	
Week 3 (9/18 – 9/22)	Section 2.4 First-Order Exact Differential Equations	
	Section 2.5 First-Order Homogeneous Differential Equations	
Week 4 (9/25 – 9/29)	Study Sessions to prepare for Test 1: sections 1.1 – 2.4 ( <b>tentatively on 9/28</b> )	
	Section 2.6 First-Order Bernoulli Differential Equations	
Week 5 (10/2 – 10/6)	(10/2) National Day for Truth and Reconciliation Observed - College Closed	
	Section 2.6 (Continued)	
	Section 2.7 Modeling with First-Order Differential Equations	

WEEK or DATE RANGE	ACTIVITY or TOPIC		
	(10/9) Thansgiving Day - College Closed		
Week 6 (10/9 – 10/13)	Section 3.8 Higher-Order NonHomogeneous Linear Equations with Constant Coefficients – Undetermined Coefficients	Second and Higher Order Linear Differential Equation and Modeling	
	Section 3.9 Second Order NonHomogeneous Linear Equations – Variation of Parameters		
Week 7 (10/16 – 10/20)	Study Sessions to prepare for Test 2: sections 2.5 – 3.8 <b>(tentatively on 10/19)</b>		
	Section 3.9 (Continued)		
Week 8 (10/23 – 10/27)	Section 3.10 Reduction of Order for Second Order Differential Equations		
	Section 3.11 Modeling with Higher-Order Differential Equations		
Week 9 (10/30 – 11/3)	Section 3.11 (Continued)		
Week 10 (11/6 – 11/10)	Section 3.11 (Continued)		Solving System of Linear DE using Matrices
	Section 4.12 Homogeneous Linear Systems		
	Study Sessions to prepare for Test 3: sections 3.9 – 3.11 <b>(tentatively on 11/16)</b>		
Week 11 (11/13 – 11/17)	(11/13) Remembrance Day Observed - College Closed		
	Study Sessions to prepare for Test 3: sections 3.9 – 3.11 <b>(tentatively on 11/16)</b>		
	Section 4.13 Nonhomogeneous Linear Systems – Variation of Parameters		
Week 12 (11/20 – 11/24)	Section 4,13 (Continued)	Solving Linear IVP using Laplace Transform	
	Section 5.14 Laplace Transforms, Inverse Transforms and Transforms of Derivatives		
	Section 5.15 Translation on the s-Axis and Translation on the t-Axis		
	Section 5.16 Derivatives of a Transform, Transforms of Integrals, and Transform of a Periodic Function		
	Section 5.17 The Dirac Delta Function		
Week 13 (11/27 – 12/1)	Study Sessions to prepare for Test 4: sections 4.12-5.17 <b>(tentatively on 11/30)</b>		
Week 14 (12/4 – 12/8)	Study Sessions to prepare for Comprehensive Final Exam		
Dec 11 – Dec 19	Final Exam <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

DESCRIPTION	WEIGHTING			
	(a) No Final Exam [only available to students with at least 50% in each term test]		(b) With Final Exam	
Term Test 1	26%	100% from Term Tests	15.6%	60% from Term Tests
Term Test 2	24%		14.4%	
Term Test 3	32%		19.2%	
Term Test 4	18%		10.8%	
Final Exam			40% from 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).

### Notes:

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

- According to the requirements of the Engineering Bridge Programs, you need to get 60% (letter grade C) if you are a first-timer and 65% (letter grade C+) if you are repeating the course.

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) – 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.

## COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

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### 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.