

# COURSE SYLLABUS



COURSE TITLE: MATH-252: Applied Differential Equations

CLASS SECTION: Section X01

TERM: WINTER 2023

COURSE CREDITS: 3

DELIVERY METHOD(S): FACE-TO-FACE

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](#).

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For COVID-19 information please visit: [camosun.ca/about/covid-19-updates](https://camosun.ca/about/covid-19-updates)

*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: Leah Howard

EMAIL: [HowardL@camosun.ca](mailto:HowardL@camosun.ca)

OFFICE: CBA 151, Interurban

HOURS: Mon and Tues 9:30-10:20; Wed-Fri 11:30-12:20

WEBSITE: [www.leahhoward.com](http://www.leahhoward.com)

*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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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.

Restricted to students in the Engineering Bridge.

PREREQUISITE(S):

MATH 250A, MATH 251

CO-REQUISITE(S):

Not Applicable

EXCLUSION(S):

Not Applicable

## COURSE LEARNING OUTCOMES / OBJECTIVES

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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

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A scientific calculator (non-programmable, non-graphing).

There is no required textbook. Suggested homework problems and answers are provided for free (on D2L).

Optional Text: ***Differential Equations with Modelling Applications*** by Zill  
Can be purchased at the Camosun Bookstore.

## 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.

1.1 Definitions and Terminology

1.2 Initial-Value Problems

2.2 Separable Variables

2.3 Linear Equations

2.4 Exact Equations

2.5 Solutions by Substitutions

3.1 Linear Models

4.1 Preliminary Theory of Higher-Order DE

4.2 Reduction of Order

4.3 Homogeneous Linear Equations with Constant Coefficients

4.4 Undetermined Coefficients: Superposition Approach

4.6 Variation of Parameters

4.7 Cauchy-Euler Equations

5.1 Linear Models: Initial-Value Problems  
6.2 Series Solutions About Ordinary Points

7.1 Definition of the Laplace Transform  
7.2 Inverse Transforms and Transforms of Derivatives  
7.3 Operational Properties I  
7.4 Operational Properties II  
7.5 The Dirac Delta Function

8.1 Preliminary Theory of Systems of DE  
8.2 Homogeneous Linear Systems  
8.3.2 Nonhomogeneous Linear Systems: Variation of Parameters

SEE PAGE 7 FOR SCHEDULE

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 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 (50 minutes long, Covers Weeks 1-3)	18%
Test 2 (50 minutes long, Covers Weeks 4-6)	18%
Test 3 (50 minutes long, Covers Weeks 8-10)	18%
Assignment (Covers Weeks 11-12)	6%
Final Exam (three hours long, Covers entire course)	40%
	<b>TOTAL</b>
	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>

SCHOOL OR DEPARTMENTAL INFORMATION

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Free math help is available in the Math Lab, TEC 142.

## 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.

Math 252 Schedule, Winter 2023

	Tues	Wed	Thurs	Fri
Jan 9-13	1.1	1.1	1.2	1.2
Jan 16-20	2.2	2.2	2.2	2.3
Jan 23-27	2.3	2.4	2.4	2.5
Jan 30-Feb 3	2.5	3.1	<b>TEST</b>	3.1
Feb 6-10	4.1	4.2	4.3	4.3
Feb 13-17	4.4	4.4	4.4	4.6
Feb 20-24	Break	Break	Break	Break
Feb 27-Mar 3	4.6	4.7	<b>TEST</b>	4.7
Mar 6-10	5.1	5.1	5.1	6.2
Mar 13-17	6.2	6.2	7.1	7.2
Mar 20-24	7.2	7.3	<b>TEST</b>	7.3
Mar 27-31	7.3	7.4	7.5	8.1
Apr 3-7	8.2	8.2	8.2 <b>ASST DUE</b>	<b>Holiday</b>
Apr 10-14	8.3	8.3	Review	Review