

COURSE SYLLABUS



COURSE TITLE: MATH-252: Applied Differential Equations

CLASS SECTION: X01 and X02

TERM: Fall 2024

COURSE CREDITS: 3

DELIVERY METHOD(S): face-to-face lectures

Camosun College respectfully acknowledges that our campuses are situated on the territories of the Lək'wəḡən (Songhees and Kosapsum) and WSÁNEĆ peoples. We honour their knowledge and welcome to all students who seek education here.

INSTRUCTOR DETAILS

NAME: Gilles Cazalais

EMAIL: cazalais@camosun.ca

OFFICE: CBA 158

HOURS: <https://sites.google.com/site/cazalais/home>

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

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): C in MATH 250A and C in MATH 251

CO-REQUISITE(S): Not Applicable

EQUIVALENCIES: 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.

TEXTBOOK & RECOMMENDED PREPARATION / INFORMATION

A first Course in Differential Equation (10th or 11th edition) by Dennis Zill

Course website: <https://sites.google.com/site/cazelais/home/math252>

A coursepack in pdf format is available on D2L.

CHAPTERS AND SECTIONS

1. Introduction to Differential Equations
 - Definitions and Terminology (section 1.1)
 - Initial-Value Problems (section 1.2)
2. First-Order Differential Equations
 - Separable Variables (section 2.2)
 - Linear Equations (section 2.3)
 - Exact Equations (section 2.4)
 - Solutions by Substitutions (section 2.5)
3. Modeling with First-Order Differential Equations
 - Linear Models (section 3.1)
4. Higher-Order Differential Equations
 - Preliminary Theory - Linear Equations (section 4.1)
 - Reduction of Order (section 4.2)
 - Homogeneous Linear Equations with Constant Coefficients (section 4.3)
 - Undetermined Coefficients | Superposition Approach (section 4.4)
 - Variation of Parameters (section 4.6)
 - Cauchy-Euler Equations (section 4.7)
5. Modeling with Higher-Order Differential Equations
 - Linear Models: Initial-Value Problems (section 5.1)
 - Spring/Mass Systems: Free Undamped Motion (5.1.1)
 - Spring/Mass Systems: Damped Motion (5.1.2)
 - Spring/Mass Systems: Driven Motion (5.1.3)
 - Series Circuit Analogue (5.1.4)
6. Series Solutions of Linear Equations
 - Review of Power Series (section 6.1)
 - Solutions About Ordinary Points (section 6.2)

7. Laplace Transforms

Definition of the Laplace Transform (section 7.1)

Inverse Transforms and Transforms of Derivatives (section 7.2)

Operational Properties I (section 7.3)

- Translation of the s -Axis (7.3.1)

- Translation of the t -Axis (7.3.2)

Operational Properties II (section 7.4)

- Derivatives of a Transform (7.4.1)

- Transforms of Integrals (7.4.2)

- Transforms of a Periodic Function (7.4.3)

The Dirac Delta Function (section 7.5)

8. Systems of Linear First-Order Differential Equations

Preliminary Theory - Linear Systems (section 8.1)

Homogeneous Linear Systems (section 8.2)

- Distinct Real Eigenvalues (8.2.1)

- Repeated Eigenvalues (8.2.2)

- Complex Eigenvalues (8.2.3)

Nonhomogeneous Linear Systems (section 8.3)

- Variation of Parameters (8.3.2)

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](https://camosun.ca/services/academic-supports/accessible-learning/academic-accommodations-exams). <https://camosun.ca/services/academic-supports/accessible-learning/academic-accommodations-exams>

EVALUATION OF LEARNING

DESCRIPTION	WEIGHTING
Assignments	6%
Test 1 (October 7)	18%
Test 2 (November 4)	18%
Test 3 (December 2)	18%
Final Exam	40%
TOTAL	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>

MISSING TESTS

No test extension or make-up test will be offered. If you are unable to write a test for a serious reason such as illness, then you must talk to me as soon as possible and the weight of the missed test will be added to the final exam.

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

Chair of the Math & Stats Department: Patrick Montgomery
Phone: 250-370-3502
Office: Ewing 268, Lansdowne Campus
Email: montgomeryp@camosun.ca

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 camosun.ca/services.

Support Service	Website
Academic Advising	camosun.ca/services/academic-supports/academic-advising
Accessible Learning	camosun.ca/services/academic-supports/accessible-learning
Counselling	camosun.ca/services/health-and-wellness/counselling-centre
Career Services	camosun.ca/services/co-operative-education-and-career-services
Financial Aid and Awards	camosun.ca/registration-records/financial-aid-awards
Help Centres (Math/English/Science)	camosun.ca/services/academic-supports/help-centres
Indigenous Student Support	camosun.ca/programs-courses/iecc/indigenous-student-services
International Student Support	camosun.ca/international

Support Service	Website
Learning Skills	camosun.ca/services/academic-supports/help-centres/writing-centre-learning-skills
Library	camosun.ca/services/library
Office of Student Support	camosun.ca/services/office-student-support
Ombudsperson	camosun.ca/services/ombudsperson
Registration	camosun.ca/registration-records/registration
Technology Support	camosun.ca/services/its
Writing Centre	camosun.ca/services/academic-supports/help-centres/writing-centre-learning-skills

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 Integrity

Students are expected to comply with all College policy regarding academic integrity; which is about honest and ethical behaviour in your education journey. The following guide is designed to help you understand your responsibilities: <https://camosun.libguides.com/academicintegrity/welcome>

Please visit <https://camosun.ca/sites/default/files/2021-05/e-1.13.pdf> for Camosun's Academic Integrity policy and details for addressing and resolving matters of academic misconduct.

Academic Accommodations for Students with Disabilities

Camosun College is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging appropriate academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you are a student with a documented disability and think you may need accommodations, you are strongly encouraged to contact the Centre for Accessible Learning (CAL) and register as early as possible. Please visit the CAL website for more information about the process of registering with CAL, including important deadlines:

<https://camosun.ca/cal>

Academic Progress

Please visit <https://camosun.ca/sites/default/files/2023-02/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 <https://camosun.ca/sites/default/files/2021-05/e-2.2.pdf> for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit <https://camosun.ca/registration-records/tuition-fees#deadlines>.

Grading Policy

Please visit <https://camosun.ca/sites/default/files/2021-05/e-1.5.pdf> for further details about grading.

Grade Review and Appeals

Please visit <https://camosun.ca/sites/default/files/2021-05/e-1.14.pdf> for policy relating to requests for review and appeal of grades.

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 (see [Medical/Compassionate Withdrawals policy](#)). Please visit <https://camosun.ca/services/forms#medical> to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence

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 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 Policy: <https://camosun.ca/sites/default/files/2021-05/e-2.9.pdf> and camosun.ca/services/sexual-violence-support-and-education.

To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-370-3841

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 <https://camosun.ca/sites/default/files/2021-05/e-2.5.pdf> to understand the College's expectations of academic integrity and student behavioural conduct.

Looking for other policies?

The full suite of College policies and directives can be found here: <https://camosun.ca/about/camosun-college-policies-and-directives>

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.