COURSE SYLLABUS

CAMOSUN COLLEGE

COURSE TITLE: MATH-252: Applied Differential Equations

CLASS SECTION: X01 and X02

TERM: Fall 2022

COURSE CREDITS: 3

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

Camosun College campuses are located on the traditional territories of the Lək̓ʷəŋən and WSÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.
Learn more about Camosun's
Territorial Acknowledgement.

For COVID-19 information please visit: 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

NAME: Gilles Cazelais

EMAIL: cazelais@camosun.ca

OFFICE: CBA 158

HOURS: https://sites.google.com/site/cazelais/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):
Restricted to students in Engineering Bridge

All of:
- C in MATH 250A
- C in MATH 251

CO-REQUISITE(S): Not Applicable
EXCLUSION(S): 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

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)

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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

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 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 http://camosun.ca/students/.

Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/
Learning Skills	http://camosun.ca/learningskills

Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

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 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. To contact the Office of Student Support: 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.