



CAMOSUN COLLEGE
School of Arts & Science
Department of Mathematics & Statistics

MATH-252- X02
Applied Differential Equations
2018 Fall

COURSE OUTLINE

The course description is online @ <http://camosun.ca/learn/calendar/current/web/math.html>

Ω Please note: This outline will not be kept indefinitely. It is recommended students keep this outline for their records, especially to assist in transfer credit to post-secondary institutions.

1. Instructor Information

Instructor:	Raymond Lai			
Office Hours:	Monday	Tuesday	Wednesday	Thursday
By Appointment, and	9:30am – 10:20am	8:30am – 9:20am	8:30am – 9:20am	9:30am – 10:20am
Location:	CBA 152			
Phone:	250-370-4491			
Email:	lai@camosun.bc.ca			
Website:	https://sites.camosun.ca/raymondlai/			

2. Intended Learning Outcomes

Upon completion of this course a student 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.

3. Required Materials

- (a) Texts: (Optional Reference) Dennis G. Zill, A First Course in Differential Equations with Modeling Applications, 10th Edition, Brooks/Cole, 2009.
- (b) Other: Non-graphing non-programmable scientific calculator

4. Course Content and Schedule

Unit 1: First-Order Differential Equations

- Section 1.1 Separable DEs (Reference: section 2.2)
- Section 1.2 Linear DEs (Reference: section 2.3)
- Section 1.3 Exact DEs (Reference: section 2.4)
- Section 1.4 Homogeneous DEs (Reference: section 2.5)
- Section 1.5 Bernoulli DEs (Reference: section 2.5)
- Section 1.6 Modeling with First-Order Differential Equations (Reference : sections 1.3, 2.3, 2.4, 2.5, 3.1, 3.2)

Unit 2: Higher-Order Differential Equations

- Section 2.7 Reduction of Order for Second Order Differential Equations (Reference: section 4.2)
- Section 2.8 Second Order NonHomogeneous Linear Equations – Variation of Parameters (Reference: section 4.6)
- Section 2.9 NonHomogeneous Linear Equations with Constant Coefficients – Undetermined Coefficients – (Reference: sections 4.3 and 4.4)
- Section 2.10 Modeling with Higher-Order Differential Equations (Reference : section 5.1)

Unit 3: Series Solution of Linear Equations

- Section 3.11 Power Series Solutions about Ordinary Points (Reference: section 6.2)

Unit 4: Laplace Transforms

- Section 4.12 Laplace Transforms, Inverse Transforms and Transforms of Derivatives (Reference: sections 7.1 and 7.2)
- Section 4.13 Translation on the s -Axis (Reference: section 7.3.1)
- Section 4.14 Translation on the t -Axis (Reference: section 7.3.2)
- Section 4.15 Derivatives of a Transform (Reference: section 7.4.1)
- Section 4.16 Transforms of Integrals (Reference: section 7.4.2)
- Section 4.17 Transform of a Periodic Function (Reference: section 7.4.3)
- Section 4.18 The Dirac Delta Function (Reference: section 7.5)

Unit 5: Systems of Linear First-Order Differential Equations

- Section 5.19 Homogeneous Linear Systems: Solutions and Trajectories (Reference: section 8.2)
- Section 5.20 Nonhomogeneous Linear Systems – Variation of Parameters (Reference: section 8.3.2)

Lectures, Reviews, Help Sessions	Tests (see 5 below)	Holiday	Total
49 hours	4 hours	3 hours	56 hours

5. Basis of Student Assessment (Weighting)

Your course grade will be determined 100% by your performances on the four term tests:

	Test 1	Test 2	Test 3	Test 4
Tentative Date	Thurs Sept 20	Fri Oct 19	Thurs Nov 8	Mon Dec 3
Weight	28%	28%	28%	16%

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

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. (See section 8A “Grading System” below.) If your term test performances are not satisfactory, you can opt in to write the optional comprehensive final examination (by notifying the instructor with email between Dec 3rd and Dec 7th and receiving confirmation from the instructor). The final examination will take place during the period of Dec 10th to Dec 18th. Your course grade will then be determined using the weighting:

	Test 1	Test 2	Test 3	Test 4	Final Exam.
Weight	14%	14%	14%	8%	50%
	(Term tests together count for 50%)				

Note:

- Once you opt in writing the final examination, you cannot go back to use 100% term work for your course grade.
- 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%	No need to write	80%
Student 2	80%	(Opt in to write) 90%	85%
Student 3	80%	(Opt in to write) 60%	70%
Student 4	55%	(Opt in to write) 75%	65%
Student 5	55%	(Opt in to write) 45%	50%

6. Grading System

Standard Grading System (GPA)

Competency Based Grading System

7. Recommended Materials to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services, or the College web site at camosun.ca.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**. It is the student’s responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services, and the College web site in the Policy Section.

How to do well in the course and where to get help

1. Do not skip classes.
2. Start working on the exercises as soon as we finish a section.
3. It is important to understand the principles involved rather than to memorize a method of solution – try variations of questions.
4. Study efficiently:
 - Working in groups is a smart way to learn mathematics; however, make sure you can solve problems yourself.
 - Keep and organize your work: Doing so will be a big time saver before term tests as you won't have time to redo all the exercises.
 - It is important **not** to spend too much time on a single exercise – as a general rule of thumb, if you spend 15 minutes either staring at a problem not knowing what to do or having trouble finding arithmetic mistakes you might have made, move on to the next exercise (bring me your work and we can go over it together – there may be typo in the answer provided, check typo corrections posted on the course website).
5. Extra help available from assistant at the Math Lab located at Technologies Centre (TEC) Room 142 (phone: 370-4492). This drop-in centre is freely available for your use to work on math homework and to seek help from the tutor on staff (see hours posted on the door).

8. College Supports, Services and Policies



Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ <http://camosun.ca/about/mental-health/emergency.html> or <http://camosun.ca/services/sexual-violence/get-support.html#urgent>

College Services

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at <http://camosun.ca/>

College Policies

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at <http://camosun.ca/about/policies/>. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

A. GRADING SYSTEMS <http://camosun.ca/about/policies/index.html>

The following two grading systems are used at Camosun College:

1. Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at <http://camosun.ca/about/policies/index.html> for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	<i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	<i>In progress:</i> A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	<i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.