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

MATH 191-DX03
APPLIED MATH FOR CIVIL/MECH 1
Fall 2020

COURSE OUTLINE

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

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

(a)	Instructor:	Raymond Lai			
(b)	Virtual Office Hours (using Blackboard Collaborate Ultra in D2L):	Monday	Tuesday	Wednesday	Thursday
		9:30am – 10:20am	10:30am – 11:20am	1:30 pm – 2:20pm	noon – 12:50pm
		Also by email appointment (preferably 24 hours in advance and first come first booked) – check the module "Email Appointment Confirmation" in the D2L Content Page for time available			
(c)	Office Location:	Blackboard Collaborate Ultra in D2L			
(d)	Office Phone:	250-370-4491			
(e)	Email:	lai@camosun.bc.ca			
(f)	Website:	https://sites.camosun.ca/raymondlai/			

2. Intended Learning Outcomes

Upon completion of this course the student will be able to:

1. Evaluate limits of functions. Using the limit definition, find derivatives of simple algebraic functions. Use derivatives to determine the slope of the tangent line to a curve, velocity, acceleration, and rates of change.
2. Use the power, product, quotient and chain rules to differentiate algebraic, trigonometric, logarithmic and exponential functions. Use implicit differentiation.
3. Find tangents and normals to given functions. Use Newton's Method to find an approximate solution to an equation. Solve problems involving related rates, curve sketching, maxima and minima, and parametrically defined curves. Find differentials, estimate errors, and linearize functions.
4. Find antiderivatives of functions and evaluate both indefinite and definite integrals. Use the trapezoidal rule and Simpson's Rule to approximate a definite integral.
5. Use integration to solve applications problems including the area between curves, volumes of solids of revolution, and centroids.
6. Calculate determinants of 2x2 and 3x3 matrices. Add, subtract and multiply matrices. Calculate the inverse of a matrix. Solve 2x2 and 3x3 linear systems using Gauss-Jordan elimination, augmented matrices and inverse matrices.

3. Required Materials

(a) Course notes (accessible from the course D2L site)
(b) Reference: Allyn J. Washington, Basic Technical Mathematics with Calculus, SI Version, 10th Ed.
(c) Other: Scientific Calculator (Graphing Calculators are not permitted.)

4. Course Content and Schedule

Section 1   Limits   [~ 2.5 hours] (Reference section 23.1)
Section 2   Slope of a Tangent to a Curve   [~ 1 hour] (Reference section 23.2)
Section 3   The Derivative   [~ 1 hour] (Reference section 23.3)
Section 4   Derivatives of Polynomials   [~ 1 hour] (Reference section 23.5)
Section 5   Derivatives as an Instantaneous Rate of Change   [~ 0.5 hour] (Reference section 23.4)
Section 6   Higher Derivatives   [~ 0.5 hour] (Reference section 23.9)
Section 7   Derivatives of Products and Quotients   [~ 2 hours] (Reference section 23.6)
Section 8   Derivatives of Powers of Functions & Chain Rule   [~ 1.5 hours] (Reference section 23.7)
Section 9   Derivatives of Implicit Functions   [~ 0.5 hour] (Reference section 23.8)

Section 10   Tangents and Normals   [~ 1 hour] (Reference section 24.1)
Section 11   Newton's Method for Solving Equations   [~ 1 hour] (Reference section 24.2)
Section 12   Curvilinear Motion   [~ 1 hour] (Reference section 24.3)
Section 13   Related Rates   [~ 2.5 hours] (Reference section 24.4)
Section 14   Using Derivatives in Curve Sketching   [~ 2 hours] (Reference sections 24.5)
Section 15   Applied Max/Min Problems   [~ 2 hours] (Reference section 24.7)
Section 16   Linear Approximations   [~ 1.5 hours] (Reference section 24.8)

Section 17   Derivatives of Sine and Cosine Functions   [~ 1.5 hours] (Reference section 27.1)
Section 18   Derivatives of the Other Trigonometric Functions   [~ 1 hour] (Reference section 27.2)
Section 19   Derivatives of the Inverse Trigonometric Functions   [~ 1 hour] (Reference section 27.3)
Section 20   Derivatives of Logarithmic Functions   [~ 1.5 hours] (Reference section 27.5)
Section 21   Derivatives of Exponential Functions   [~ 0.5 hour] (Reference section 27.6)
Section 22   Applications of Derivative   [~ 1 hour] (Reference section 27.4 and section 27.8)

Section 23   Antiderivatives   [~ 0.5 hour] (Reference section 25.1)
Section 24   Indefinite Integral   [~ 1 hour] (Reference section 25.2)
Section 25   Area under a Curve   [~ 0.5 hour] (Reference section 25.3)
Section 26   Definite Integral   [~ 0.75 hour] (Reference section 25.4)
Section 27   Numerical Integration: Trapezoidal Rule   [~ 0.75 hour] (Reference section 25.5)
Section 28   Numerical Integration: Simpson's Rule   [~ 0.5 hour] (Reference section 25.6)

Section 29   Applications of the Indefinite Integral   [~ 1 hour] (Reference section 26.1)
Section 30   Areas by Integration   [~ 1.5 hours] (Reference section 26.2)
Section 31   Volumes by Integration   [~ 1 hour] (Reference section 26.3)
Section 32   Centroids (2-dimensional only)   [~ 1 hour] (Reference section 26.4)
Section 33   Other Applications of Definite Integrals   [~ 1.5 hours] (Reference section 26.6)

Section 34   Introduction to Matrices: Definitions and Basic Operations
       [~ 0.5 hour] (Reference section 16.1)
Section 35   Matrix Multiplication   [~ 1.5 hours] (Reference section 16.2)
Section 36   Matrix Inverses   [~ 1.5 hours] (Reference section 16.2 and section 16.3)
Section 37   Matrices and Linear Equations   [~ 0.5 hour] (Reference section 16.4)
Section 38   Gaussian Elimination and Gauss Jordan Elimination   [~ 1 hour] (Reference section 16.5)

5. Basis of Student Assessment (Weighting)

Your course grade will be determined by using one of the following two methods:

(a) <u>If your performance on each of the four term tests is at least 30%</u>, your course grade can be determined 100% by your performances on the term tests using the following weighting – Table 1 (you do not need to write the comprehensive final exam but you can opt in if you want to – see Table 2 below):

	Test 1	Test 2	Test 3	Test 4
Tentative Date (Victoria local time)	Sept 30th (Wed)	Oct 28th (Wed)	Nov 24th (Tue)	Dec 10th (Thurs)
Sections Covered	1 to 9	10 to 19	20 to 32	33 to 38
Weight	25%	30%	28%	17%

(b) <u>If you fall short of getting at least 30% in any of the term tests</u>, you will need to write the comprehensive final exam. The final examination will take place during the period of Dec14th to Dec 22nd.

Your course grade will then be determined using the following weighting – Table 2:

Table 2	Test 1	Test 2	Test 3	Test 4	Comprehensive Final Exam.
Weight	12.5%	15%	14%	8.5%	50%
	(Term tests together count for 50%)				

Notes:

- Thorough understanding of the examples discussed in class and in the notes and completion of the exercises in the notes will be essential for success on the term tests.
- There is no makeup for missed test.
- Regardless of what your term mark is, you can opt in to write the comprehensive final examination (by notifying the instructor with email during the last week of classes between Dec 7th and Dec 11th).
- 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 Test Minimum	Weighted Term Tests	Final Exam	Course
Student 1	40%	80%	Do not write	80%
Student 2	40%	80%	(Opt in to write) 90%	85%
Student 3	40%	80%	(Opt in to write) 60%	70%
Student 4	40%	55%	(Opt in to write) 75%	65%
Student 5	40%	55%	(Opt in to write) 45%	50%
Student 6	20%	80%	(Need to write) 90%	85%
Student 7	20%	80%	(Need to write) 60%	70%
Student 8	20%	55%	(Need to write) 75%	65%
Student 9	20%	55%	(Need to write) 45%	50%

Instructions on writing Online Tests/Exam:

- 1. Download and print out the test from the course D2L site.
  2. Complete the test in ink (or using pencil), please make sure it is dark enough for scan to be legible).
  3. Scan the finished test and save it as one single pdf file.
  4. Submit your pdf file before the deadline.
- You earn credits by using **only** the method(s) used in the examples in class and/or in the notes. Other methods of solutions are not accepted.
- For full credits of you solutions, show details comparable to the examples discussed in class and/or shown in the course notes.
- The only materials you can use are non-graphing non-programmable scientific calculators.
- Taking into consideration of the work before and after writing the test, the start time of the 50-minute test is 15 minutes before the class start time and the end time (also the due time of submission) of the test is 15 minutes after the class end time.

6. Grading System

[X] Standard Grading System (GPA)

[ ] Competency Based Grading System

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

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 with each other is a smart way to learn mathematics; however, make sure you can solve problems yourself.
   - 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 (email me your work and we can go over it together – there may be typo in the answer provided, check typo corrections posted on the D2L course site).
   - In addition to getting help from your instructor, you can also do so by visiting the math help center at http://camosun.ca/learn/subjects/mathematics/help-with-math.html

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	*Incomplete*: 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	*In progress*: 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	**Compulsory Withdrawal*: 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.*