

	<p><b>School of Arts &amp; Science</b>  <b>MATHEMATICS DEPARTMENT</b></p> <p><b>MATH 250A-Section X02</b>  <b>Intermediate Calculus 1</b>  <b>2014 Quarter 4</b></p>
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## COURSE OUTLINE

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

- \* Please note: the College electronically stores this outline for five (5) years only.  
 It is **strongly recommended** you keep a copy of this outline with your academic records.  
 You will need this outline for any future application/s for transfer credit/s to other colleges/universities.

### 1. Instructor Information

Instructor:	Raymond Lai
Office Hours:	Drop in Monday to Friday: 11:30 – 12:20; by appointment at other times
Office	CBA 152
Phone:	250-370-4491
Email:	<a href="mailto:lai@camosun.bc.ca">lai@camosun.bc.ca</a>
Website:	<a href="http://faculty.camosun.ca/raymondlai/home-2/courses/">http://faculty.camosun.ca/raymondlai/home-2/courses/</a>

### 2. Course Description

This course is a component of the Engineering Bridge Program. Topics discussed include techniques of integration, indeterminate forms, infinite series, polar coordinates, and vector functions.

Offered: Quarter 2 and quarter 4

Credit: 3

In-Class Workload and Format: 5 hours of lecture/week for 11 weeks

Out-of-Class Workload: 5-10 hours/week

Prerequisites: Restricted to students enrolled in the Engineering Bridge Program

Co-requisites: Math 251

### 3. Intended Learning Outcomes

Upon successful completion of this course a student will be able to:

1. Explain what calculus is and how it compares to pre-calculus. Describe the tangent line problem in differential calculus and that the area problem in integral calculus.
2. Use numerical methods, algebraic methods, the squeeze theorem, and the formal limit definition to evaluate limits.

3. Determine continuity at a point and continuity on open or closed intervals. Evaluate one-sided limits. Use the properties of limits to evaluate limits. Apply the Intermediate Value Theorem to locate zeros of a polynomial.
4. Use the chain rule and the power rule to find derivatives of composite and trigonometric functions.
5. Use implicit differentiation to find the derivative of a function.
6. Use pattern recognition, change of variables, and the General Power Rule to evaluate definite and indefinite integral.
7. Evaluate definite and indefinite integrals by fitting an integrand to one of the basis integration rules, the tabular method of integration by parts, trigonometric substitution, partial fractions, and integral tables. Evaluate definite and indefinite integrals of products of trigonometric functions.
8. Use L'Hôpital's rule to evaluate limits involving indeterminate forms.
9. Evaluate improper integrals with infinite limits and with infinite discontinuities.
10. Use infinite geometric series, the  $n$ th-Term Divergence test, the Integral Test,  $p$ -series, the Direct Comparison Test, the Limit Comparison Test, the Alternating Series Test, the Ratio Test, and the Root Test to determine whether a series converges or diverges.
11. Find Taylor or Maclaurin polynomial approximation of elementary functions. Use Taylor's Remainder Theorem to estimate the error in using a Taylor Polynomial approximation. Find a Taylor or Maclaurin series for a given function. Use the binomial series and other known series to determine Taylor series for other functions.
12. Find a set of parametric equations to represent a given curve. Find the slope of a tangent line to a curve given in parametric form. Find the arc length of a curve given in parametric form. Find the area of a surface of revolution using parametric form.
13. Convert equations in rectangular form to polar form and equations in polar form to rectangular form. Find the slope of a tangent line to a polar graph. Identify the graphs of standard polar equations.
14. Find the area of a region bounded by a polar graph or graphs. Find the arc length of a polar graph. Find the area of a surface of revolution given in polar form.
15. Express equations of conics in polar form. Use polar form to solve problems involving Kepler's Laws.
16. Express vectors in component form and as a linear combination of standard unit vectors. Add and subtract vectors geometrically and use vectors to solve problems involving force and velocity.
17. Understand the three-dimensional coordinate system and use three-dimensional vectors to solve real-life problems.
18. Use the dot product of vectors and the properties of the dot product to find the angle between to vectors, the projection of a vector onto another vector, and to find the work done by a constant force. Find the cross product of two vectors and the triple scalar product of three vectors in space.
19. Express the equation of a line in space in parametric, vector, and standard forms. Express the equation of a plane in space in point-normal, vector and standard forms. Find the distance between points, planes, and lines in space.
20. Recognize and write equations for cylindrical surfaces, quadratic surfaces, and surfaces of revolution. Use cylindrical and spherical coordinates to represent surfaces in space.
21. Extend the concepts of limits and continuity to vector-valued functions. Differentiate and integrate vector-valued functions. Find the velocity and acceleration associated with a vector-valued function. Use vector-valued functions to solve projectile problems. Find a unit tangent vector at a point on a space curve and find the tangential and normal components of acceleration. Find the arc length of a space curve.

#### 4. Required Materials

Optional Reference: Edwards and Penney, *Calculus Early Transcendentals*, Seventh Edition, Pearson Prentice Hall, 2008.  
 Non-graphing non-programmable scientific calculator.

## 5. Course Content and Tentative Schedule

### Chapter 1: Derivative (Review)

- Section 1.1 (Reference: section 3.2) Basic Differentiation Rules
- Section 1.2 (Reference: section 3.3) The Chain Rule
- Section 1.3 (Reference: section 3.7) Derivatives of Trigonometric Functions
- Section 1.4 (Reference: section 3.8) Exponential and Logarithmic Functions
- Section 1.5 (Reference: section 3.9) Implicit Differentiation
- Section 1.6 (Reference: section 6.8) Inverse Trigonometric Functions

### Chapter 2: Techniques of Integration and Applications of Integral

- Section 2.1 (Reference: sections 5.7 and 7.2) Integration by Substitution
- Section 2.2 (Reference: section 5.8) Areas of Plane Regions
- Section 2.3 (Reference: section 7.3) Integration by Parts
- Section 2.4 (Reference: section 7.4) Trigonometric Integrals
- Section 2.5 (Reference: section 7.5) Integration of Rational Functions by using Partial Fractions
- Section 2.6 (Reference: section 6.8) Inverse Trigonometric Functions
- Section 2.7 (Reference: section 7.6) Trigonometric Substitutions

### Chapter 3: Limits, Indeterminate Forms, and Improper Integrals

- Section 3.1 (Reference: sections 2.2 and 2.3) Review of Limits
- Section 3.2 (Reference: section 2.4) The Concept of Continuity
- Section 3.3 (Reference: section 4.8) Basic Indeterminate Forms and L'Hôpital's Rule
- Section 3.4 (Reference: section 4.9) More Indeterminate Forms
- Section 3.5 (Reference: section 7.8) Improper Integrals

### Chapter 4: Parametric Curves and Polar Coordinates

- Section 4.1 (Reference: section 9.4) Parametric Curves
- Section 4.2 (Reference: section 9.5) Integral Computations with Parametric Curves
- Section 4.3 (Reference: section 9.2, 9.4) Polar Coordinates
- Section 4.4 (Reference: section 9.3, 9.5) Integral Computations in Polar Coordinates
- Section 4.5 (Reference: section 9.6) Conic Sections

### Chapter 5: Infinite Series

- Section 5.1 (Reference: section 10.2) Infinite Sequences
- Section 5.2 (Reference: section 10.3) Infinite Series and Convergence
- Section 5.3 (Reference: section 10.4) Taylor Series and Taylor Polynomials
- Section 5.4 (Reference: section 10.5) The Integral Test
- Section 5.5 (Reference: section 10.6) Comparison Tests (for Positive Term Series)
- Section 5.6 (Reference: section 10.7) Alternating Series and Absolute Convergence
- Section 5.7 (Reference: section 10.7) The Ratio Test and the Root Test
- Section 5.8 (Reference: sections 10.8 and 10.9) Power Series and their Computations

## Chapter 6: Vectors and Curves

Section 6.1 (Reference: section 11.1)	Vectors in the Plane
Section 6.2 (Reference: sections 11.2 and 11.3)	Three-Dimensional Vectors
Section 6.3 (Reference: section 11.4)	Lines and Planes in Space
Section 6.4 (Reference: section 11.5)	Curves and Motion in Space
Section 6.5 (Reference: section 11.6)	Curvature and Acceleration

Lectures and Help Sessions	47 hours
Tests	3 hours
<u>Orientation and holiday</u>	<u>5 hours</u>
Total	55 hours

### 6. Basis of Student Assessment (Weighting)

To get a C or better in the course, you must get 50% or higher in the final exam *\*and\** have an overall average of 60% or higher; your numerical grade will be computed using the following two components, which is then converted to a letter grade using the standard Camosun grade scale (see Grading System (8) below).

- 3 Tests (total 50%)
  - Tentatively on **Friday July 25 (20%), Friday August 22 (20%), Friday September 5 (10%)**
  - Thorough understanding of the examples discussed in class and your ability to solve assignment problems will be essential for good performance on the term tests.
  - Solutions will be either posted online at the class's website or emailed to you.
  - There is no makeup for missed test (except for documented medical reasons) .
- Comprehensive Final Exam (50%)
  - During the week of **September 13 – September 20.**
  - As stated in the college calendar, "Students are expected to write tests and final examinations at the scheduled time and place. ... Exceptions, due to emergency circumstances, such as unavoidable employment commitments, health problems, or unavoidable family crisis, require approval of the appropriate instructor. Holidays or scheduled flights are not considered to be emergencies. The student may be required to provide verification of the emergency circumstances."

*There is one exception:* if your term work is at least 50% *\*and\** you received 60% or higher in the final exam, then you will receive a C in the course *\*even if\** your overall average is under 60%.

Note: We **do not** use 100% final exam to determine your course grade even if your final exam mark is better than your term mark.

### 7. Course Policy

- Students are responsible for announcements made in class (check with your fellow students if you miss a class).

- Students with mobile phones are expected to have the ringers turned off while attending class and writing term tests and final examination. There is no use of any electronic equipment other than a non-graphing non-programmable scientific calculator in term tests and final exam.
- No access to washroom facilities is allowed during the 50-minute term tests. During the 3-hour multi-section final examination, access to washroom facilities is allowed only between sections.

## 8. Grading System

### 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	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	1
0-49	F	Minimum level has not been achieved.	0

### 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 [camosun.ca](http://camosun.ca) or 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.

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 E-1.5 at [camosun.ca](http://camosun.ca) for information on conversion to final grades, and for additional information on student record and transcript notations.

Note: A course with a "D" or "F" grade cannot be used as a prerequisite.

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

- Extra help available from assistant at the Math Lab: TEC142.
- Videos on various topics available at Khan Academy: <http://www.khanacademy.org/>

**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](http://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 on the College web site in the Policy Section.