



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

MATH-108-004
Applied Calculus
Fall 2019

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

| | | | |
|------------------|--|--------------|--|
| (a) Instructor | Dan Bergerud | | |
| (b) Office hours | Monday to Friday 11:30 – 12:30 pm | | |
| (c) Location | Ewing 264 | | |
| (d) Phone | 250-370-3495 | Alternative: | |
| (e) E-mail | bergerud@camosun.bc.ca | | |
| (f) Website | | | |

2. Intended Learning Outcomes

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

1. Find the limit of elementary functions as the independent variable approaches some finite value or approaches infinity.
2. Find the derivative of simple functions using the definition of the derivative.
3. Find the derivative of functions (polynomial, trigonometric, logarithmic and exponential functions) using the product, quotient and chain rule.
4. Find the derivative using implicit differentiation.
5. Solve problems involving rates of change.
6. Find relative and absolute extrema of functions.
7. Sketch graphs of functions identifying such features as relative extrema, intervals where the function is increasing and decreasing, points of inflection, intervals where the function is concave up and concave down, and asymptotes.
8. Solve problems that involve maximizing or minimizing some variable associated with the problem.
9. Find the approximate area under a curve using the area of a set of approximating rectangles.
10. Evaluate a definite and an indefinite integral of polynomial, trigonometric, logarithmic and exponential functions using the Fundamental theorem of Calculus.
11. Evaluate integrals using the method of substitution.
12. Use integration to find the area between two curves.
13. Evaluate a definite and indefinite integral by the method of integration by parts.
14. Solve elementary differential equations using the method of separation of variables.
15. Solve problems using differential and integral calculus that involve applications from business and/or biological sciences.

3. Required Materials

- (a) Textbook
RN Greenwell, NP Ritchey and ML Lial, *Calculus with Applications for the Life Sciences*, Custom Edition for Camosun College, Pearson, 2003.

Note: The custom edition of the textbook is a less expensive, paperback version of the regular 1st edition of the textbook with chapters 9, 10, 12 and 13 omitted as they are unneeded.

- (b) Other
The Sharp EL-531X scientific calculator (or the discontinued EL-531W)

4. Course Content and Schedule

Chapter R: Algebra Reference – for reference/review

- R.1 Polynomials
- R.2 Factoring
- R.3 Rational Equations
- R.4 Equations
- R.5 Inequalities
- R.6 Exponents
- R.7 Radicals

Chapter 1: Functions

- 1.1 Lines and Linear Functions
- 1.3 Properties of Functions
- 1.4 Quadratic Functions; Translation and Reflection
- 1.5 Polynomial and Rational Functions

Chapter 2: Exponential, Logarithmic, and Trigonometric Functions

- 2.1 Exponential Functions
- 2.2 Logarithmic Functions
- 2.3 Applications: Growth and Decay
- 2.4 Trigonometric Functions

Chapter 3: The Derivative

- 3.1 Limits
- 3.2 Continuity
- 3.3 Rates of Change
- 3.4 Definition of the Derivative
- 3.5 Graphical Differentiation

Chapter 4: Calculating the Derivative

- 4.1 Techniques for Finding Derivatives
- 4.2 Derivatives of Products and Quotients
- 4.3 The Chain Rule
- 4.4 Derivatives of Exponential Functions
- 4.5 Derivatives of Logarithmic Functions
- 4.6 Derivatives of Trigonometric Functions

Chapter 5: Graphs and the Derivative

- 5.1 Increasing and Decreasing Functions
- 5.2 Relative Extrema
- 5.3 Higher Derivatives, Concavity, and the Second Derivative Test
- 5.4 Curve Sketching

Chapter 6: Applications of the Derivative

- 6.1 Absolute Extrema
- 6.2 Applications of Extrema
- 6.3 Implicit Differentiation
- 6.4 Related Rates
- 6.5 Differentials: Linear Approximation

Chapter 7: Integration

- 7.1 Antiderivatives

- 7.2 Substitution
- 7.3 Area and the Definite Integral
- 7.4 The Fundamental Theorem of Calculus
- 7.5 Integrals of Trigonometric Functions
- 7.6 The Area Between Two Curves
- Chapter 8: Further Techniques and Applications of Integration
 - 8.2 Integration by Parts
- Chapter 11: Differential Equations
 - 11.1 Solutions of Elementary and Separable Differential Equations
- EXTRA: Newton's Method (class notes)

5. Basis of Student Assessment (Weighting)

- (a) Assignments – 20%
- (b) Tests – 30%
- (c) Final Exam – 50%

6. Grading System

- Standard Grading System (GPA)
- Competency Based Grading System

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

The MATH LAB is located in Ewing 224. 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 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. |
|----|---|