



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

**MATH-115-D01**  
**Precalculus**  
**Fall 2020**

**COURSE OUTLINE**

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

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**1. Instructor Information**

(a) Instructor	Laura Shepherd
(b) Office hours	By email: Monday – Friday 8:30am – 2:20pm
(c) Location	N/A
(d) Phone	N/A
(e) E-mail	shepherd@camosun.bc.ca
(f) Website	https://online.camosun.ca/d2l/home

**2. Intended Learning Outcomes**

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

1. Read and write mathematics at a level sufficient for entry into first-year calculus.
2. Write equations of circles and ellipses in standard form and graph these relations. Expand binomials using Pascal's triangle. Factor and simplify expressions with rational exponents. Solve polynomial and rational inequalities. State the Remainder, Factor and Rational Zeros Theorems and use these theorems to factor polynomials and find their real zeros.
3. Define the term function. Find the domain of functions. Compose and decompose functions. Construct algebraic functions to model simple real-life problems. Solve optimization problems modelled with quadratic functions.
4. Identify the graphs of common algebraic functions. Evaluate and graph piecewise defined functions. Interpret and graph multiple transformations of functions. Analyze and graph polynomial and rational functions.
5. Find inverse functions algebraically and graphically. Explain the relationship between exponential and logarithmic functions. Graph exponential and logarithmic functions and their transformations. Prove the properties of logarithms and use these properties to simplify expressions and solve equations. Solve applied problems involving pH, the Richter scale, decibels, compound interest, exponential growth, exponential decay and logistic growth.
6. State the right triangle definitions for the trigonometric functions. Use reference triangles to find exact values of trigonometric functions of special angles. Define a radian and work with radian measure. State the unit circle definitions for the sine and cosine functions. Graph the six trigonometric functions and transformations of these functions. Analyze sinusoidal graphs and construct possible equations. Graph the inverse sine, cosine and tangent functions. Find exact values for compositions of trigonometric and inverse trigonometric functions. Write compositions as algebraic expressions.
7. Derive the Pythagorean identities, the sum and difference identities, the double angle identities, the power reducing identities, and the half angle identities. Use these identities to simplify expressions and verify other identities. Find exact and approximate solutions of trigonometric equations, including equations involving identities and multiples of angles.

8. Identify patterns in sequences and write formulas for the general terms. Simplify and evaluate basic sums of sequences. Derive formulas for the  $n$ th terms of arithmetic and geometric sequences and for the sums of the first  $n$  terms of these sequences. Solve word problems involving arithmetic and geometric sequences and series.
9. Evaluate limits graphically, numerically and algebraically. Use the definition of a derivative to differentiate basic polynomial, rational and radical functions. Differentiate polynomials using standard rules. Demonstrate an understanding of both the geometrical and physical interpretations of derivatives.

### **3. Required Materials**

Textbook: Algebra & Trigonometry (11th. Edition) by Sullivan

### **4. Chapters and Sections**

#### **Chapter R: Review**

- R.5 Factoring Polynomials
- R.6 Synthetic Division
- R.7 Rational Expressions
- R.8  $n$ th Roots; Rational Exponents

#### **Chapter 1: Equations and Inequalities**

- 1.1 Linear Equations
- 1.2 Quadratic Equations
- 1.4 Radical Equations; Equations Quadratic in Form; Factorable Equations
- 1.5 Solving Inequalities

#### **Chapter 2: Graphs**

- 2.1 Distance & Midpoint Formulas
- 2.2 Graphs of Equations in Two Variables; Intercepts; Symmetry
- 2.3 Lines
- 2.4 Circles

#### **Chapter 3: Functions and Their Graphs**

- 3.1 Functions
- 3.2 The Graph of a Function
- 3.3 Properties of Functions
- 3.4 Library of Functions; Piecewise-defined Functions
- 3.5 Graphing Techniques: Transformations
- 3.6 Mathematical Models: Building Functions

#### **Chapter 4: Linear and Quadratic Functions**

- 4.1 Properties of Linear Functions and Linear Models
- 4.3 Quadratic Functions and Their Properties
- 4.4 Building Quadratic Models from Verbal Descriptions and from Data
- 4.5 Inequalities Involving Quadratic Functions

## **Chapter 5: Polynomial and Rational Functions**

- 5.1 Polynomial Functions
- 5.2 Graphing Polynomial Functions; Models
- 5.3 Properties of Rational Functions
- 5.4 The Graph of a Rational Function
- 5.5 Polynomial and Rational Inequalities
- 5.6 The Real Zeros of a Polynomial Function

## **Chapter 6: Exponential and Logarithmic Functions**

- 6.1 Composite Functions
- 6.2 One-to-One Functions; Inverse Functions
- 6.3 Exponential Functions
- 6.4 Logarithmic Functions
- 6.5 Properties of Logarithms
- 6.6 Logarithmic and Exponential Equations
- 6.7 Financial Models
- 6.8 Exponential Growth and Decay Models; Newton's Law; Logistic Growth and Decay Models

## **Chapter 7: Trigonometric Functions**

- 7.1 Angles, Arc Length, and Circular Motion
- 7.2 Right Triangle Trigonometry
- 7.3 Computing the Values of Trigonometric Functions of Acute Angles
- 7.4 Trigonometric Functions of Any Angle
- 7.5 Unit Circle Approach; Properties of the Trigonometric Functions
- 7.6 Graphs of the Sine and Cosine Functions
- 7.7 Graphs of the Tangent, Cotangent, Cosecant, and Secant Functions
- 7.8 Phase Shift; Sinusoidal Curve Fitting

## **Chapter 8: Analytic Trigonometry**

- 8.1 The Inverse Sine, Cosine and Tangent Functions
- 8.2 The Inverse Trigonometric Functions (Continued)
- 8.3 Trigonometric Equations
- 8.4 Trigonometric Identities
- 8.5 Sum and Difference Formulas
- 8.6 Double-angle and Half-angle Formulas

## **Chapter 11: Analytic Geometry**

- 11.3 The Ellipse
- 11.4 The Hyperbola

## **Chapter 13: Sequences; Induction; the Binomial Theorem**

- 13.1 Sequences
- 13.2 Arithmetic Sequences
- 13.3 Geometric Sequences; Geometric Series

## 5. Basis of Student Assessment (Weighting)

*(Should be directly linked to learning outcomes.)*

(a) Assignments (15%)

**Practice Assignment:** (no marks) Due Friday September 11th

**Assignment One:** Due Wednesday September 23<sup>rd</sup>

**Assignment Two:** Due Tuesday October 13<sup>th</sup>

**Assignment Three:** Due Friday November 13<sup>th</sup>

**Assignment Four:** Due Friday December 11th

(b) Quizzes (25%)

**Quiz One:** (During scheduled class time.) Wednesday September 30th

**Quiz Two:** (During scheduled class time.) Tuesday October 20th

**Quiz Three:** (During scheduled class time.) Friday November 20th

(c) Term Tests (30%)

**Test 1:** (During scheduled class time.) Wednesday October 7th

**Test 2:** (During scheduled class time.) Tuesday October 27th

**Test 3:** (During scheduled class time.) Friday November 27th

(d) Final Exam (30%)

**Final Exam Period: December 14th - 22th**

Students MUST be available to write the exam at the scheduled time.

## 6. Grading System

Standard Grading System (GPA)

Competency Based Grading System

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

Camosun Online Math Lab: <http://camosun.ca/services/help-centres/math-help.html#MATH072>

## 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.