



**School of Arts & Science  
MATHEMATICS DEPARTMENT**

**MATH-115  
Pre-Calculus  
2011F**

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## **COURSE OUTLINE**

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### **1. Text & Instructor Information**

**Text:** Sullivan, Algebra & Trigonometry, First Custom Edition (from the 8<sup>th</sup>)

**Instructor:**

Wayne Matthews  
Office Ewing 248  
Hrs: 12:45 – 2:00 M, Tu, Th  
[mattheww@camosun.bc.ca](mailto:mattheww@camosun.bc.ca)  
250-370-3107

**Website:** Camosun Math Dept [www.camosun.ca/math](http://www.camosun.ca/math)

### **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. Factor and simplify expressions with rational exponents.
3. Write equations of circles and ellipses in standard form and graph these relations.
4. Define the term function. Determine if relations are functions. Find the domains of functions. Define even and odd functions and test functions to determine if they are even, odd or neither. Form and simplify difference quotients and explain their graphical interpretation and significance.
5. Identify the graphs of common algebraic functions. Evaluate and graph piecewise defined functions.
6. Construct algebraic functions to model simple real-life problems.
7. Translate verbal descriptions of transformations to function notation and vice versa. Interpret and graph multiple transformations of functions.
8. Analyze and graph quadratic functions. Solve optimization problems modeled with quadratic functions.
9. Graph polynomial functions using end behaviour and behaviour near their x-intercepts. Analyze graphs of polynomial functions and construct possible equations.
10. Graph rational functions using symmetry, asymptotes, behaviour near their x-intercepts and tables of signs. Analyze graphs of rational functions and construct possible equations.
11. Solve polynomial and rational inequalities.
12. State the Remainder, Factor and Rational Zeros Theorems and use these theorems to factor polynomials and find their real zeros.
13. Compose and decompose functions. State the definition of an inverse function. Verify that two functions are inverses using the definition. Find inverse functions algebraically and graphically.
14. Explain the relationship between exponential and logarithmic functions. Graph exponential and logarithmic functions and their transformations.
15. Prove the properties of logarithms and use these properties to simplify expressions and solve equations.
16. Solve applied problems involving pH, the Richter scale, decibels, compound interest, exponential growth, exponential decay and logistic growth.
17. Define a radian and work with radian measure. Convert between degree and radian measure.

18. State the unit circle definitions for the sine and cosine functions. Using the definitions, deduce properties of the sine and cosine functions and sketch their graphs. Graph transformations of these functions. Analyze sinusoidal graphs and construct possible equations.
19. Define the tangent, cotangent, secant and cosecant functions in terms of the sine and cosine functions. Graph the tangent, cotangent, secant and cosecant functions using the sine and cosine graphs.
20. State the right triangle definitions for the trigonometric functions. Use reference triangles to find exact values of trigonometric functions.
21. 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.
22. Graph the inverse sine, cosine and tangent functions. Find exact values for compositions of trigonometric and inverse trigonometric functions. Write compositions as algebraic expressions.
23. Find exact and approximate solutions of trigonometric equations, including equations involving identities and multiples of angles.
24. Identify patterns in sequences and write formulas for the general terms. Write the terms of recursively defined sequences. Express sums using summation notation. Simplify and evaluate basic sums of sequences.
25. Identify geometric sequences and series. 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.
26. Expand binomials using Pascal's triangle.

### 3. Course Content and Schedule

This course provides excellent preparation for MATH 100. Students away from algebra for more than a year should either refresh with MATH 073 before taking 115, or register for MATH 105 instead of 115. Topics: polynomial, rational, exponential, logarithmic, trigonometric and inverse trigonometric functions; sequences and series. (T)

Note: Credit may be obtained for only one of MATH 105, 107 or 115.

UNIT	SECTIONS
<b>1. Review, Equations, Graphs</b>	
<ul style="list-style-type: none"> <li>• Are you ready for Pre-Calculus?</li> <li>• Algebra Review</li> <li>• Equations, Inequalities</li> <li>• Graphs of Equations</li> <li>• Binomial Expansion</li> <li>• Conics</li> </ul>	Package (Dept. Website) R.1 → R.5, R.7, R.8 1.1, 1.2, 1.4, 1.5 2.1 → 2.4 13.5 Handout <b>Test # 1</b>
<b>2. Functions</b>	
<ul style="list-style-type: none"> <li>• Properties of Functions</li> <li>• Graphing - transformations</li> <li>• Linear &amp; Quadratic Functions</li> <li>• Quadratic Inequalities</li> <li>• Polynomial &amp; Rational Functions</li> <li>• Polynomial &amp; Rational Inequalities</li> <li>• Factor/Remainder Theorem</li> </ul>	3.1 → 3.3 3.4 to 3.6 4.1 → 4.4 4.5 5.1 → 5.3 5.4 5.5 <b>Test # 2</b>
<b>3. Exponential &amp; Logarithmic Functions</b>	
<ul style="list-style-type: none"> <li>• Composite &amp; Inverse Functions</li> <li>• Logarithmic, Exponential Functions</li> <li>• Equations &amp; Applications</li> </ul>	6.1, 6.2 6.3 → 6.5 6.6 → 6.8

- Test # 3**
- 4. Trigonometry – Part 1**
- Radians, basic trigonometry 7.1 → 7.3
  - Trig functions of any angle 7.4, 7.5
  - Graphs of trig functions 7.6 → 7.8
  - Inverse Trig Functions 8.1, 8.2
  - Basic Trig Identities 8.3
- Test # 4**
- 5. Trig – Part 2, Sequences, Series, Intro to Calculus**
- Further Trig Identities 8.4 → 8.5
  - Trigonometric Equations 8.6, 8.7
  - Sequences & Series 13.1 → 13.3
  - Introduction to Calculus Package (Bookstore)
- Test # 5**

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

1. Assignments (one per unit) are due two days before the test date for that unit.
2. [The Sharp EL-531W](#) scientific calculator is the only calculator that may be used on tests and examinations
3. Need extra help? See me in my office M, Tu, Th 12:45 – 2:00, or the tutors in the math lab (Ewing 224 or E 342). [www.camosun/math-help](http://www.camosun/math-help)
4. If your term mark (best 4/5 tests) is above 50% and your final exam mark is higher than your term mark, the final exam mark will become your mark for the course.
5. Evaluation: Assignments (10%), Tests (40%), Final (50% or 100%)

#### 5. 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 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.

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, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. <i>(For these courses a final grade will be assigned to either the 3<sup>rd</sup> course attempt or at the point of course completion.)</i>
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.

## 6. Recommended Materials or Services 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](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.