OptionButton1 **School of Arts & Science**
MATHEMATICS DEPARTMENT

MATH 115-001
Pre-Calculus
Spring term /07

COURSE OUTLINE

The Approved Course Description is available on the web @
Tschritter.disted.camosun.bc.ca

Ω *Please note: this outline will be electronically stored for five (5) years only.*
It is strongly recommended students keep this outline for your records.

1. Instructor Information

(a)	Instructor:	Richard Tschritter	
(b)	Office Hours:	Mon to Thursday 8:00 am-8:20 am, 11:00 am-11:50 am, 2:30-3:00 pm	
(c)	Location:	E-268	
(d)	Phone:	370-3494	Alternative Phone:
(e)	Email:	tschriter@camosun.bc.ca	
(f)	Website:	Tschritter.disted.camosun.bc.ca	

2. Intended Learning Outcomes
(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

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

1. Evaluate functions, find the domain of functions, compose and decompose functions and find inverse functions.
2. Graph polynomial and rational functions using symmetry, intercepts, long run behaviour, asymptotes and a table of signs.
3. Prove the Remainder and Factor Theorems and use the theorems to factor polynomials and find their real and complex zeros.
4. Graph exponential and logarithmic functions and their transformations.
5. Prove the properties of logarithms and use these properties to simplify expressions, and solve equations and applied problems.
6. Graph the six trigonometric functions and their transformations and the three basic inverse trigonometric functions.
7. Use the unit circle definitions to derive the Pythagorean identities, the sum and difference formulas, and the double angle and half angle formulas. Use these identities to simplify expressions, solve equations and verify other identities.
8. Use trigonometric functions to model real-life problems involving cyclical patterns.
9. Evaluate limits, find derivatives using the definition, find equations of tangent lines and solve optimization problems using polynomial calculus.
10. Read and write mathematics at a level sufficient for entry into first year calculus.

Math 115 Study Guide, Rich Tschritter's Class

By studying the following core material, you will be preparing yourself for at least 90 percent of the questions on any term test or the final exam. Moreover, any non-core questions will be similar to ones done in class and/or the homewor...

Test 1: Algebra Prerequisites; Functions & their Graphs (35-40 marks)

1. Add rational algebraic expressions and/or simplify a complex fraction.

    (3 - 5 marks)

2. Solve a rational algebraic equation.

    (3 - 5 marks)

3. Solve a rational algebraic inequality. You will need to use real number line to test intervals.

    (3 - 5 marks)

4. Be able to recognize whether a certain graph is that of a function or not.

    (0-1 mark)

5. Sketch a piecewise-defined function.

    (3-5 marks)

6. Be able to evaluate a difference quotient similar to

    $\dfrac{f(x+h)-f(x)}{h}$ or $\dfrac{f(x_2)-f(x_1)}{x_2-x_1}$ for a given

    function.

    (2 - 4 marks)

7. Test for symmetry: odd, even or neither. Be sure to do it algebraically, by comparing $f(-x)$ to $f(x)$ and be able to interpret the graphical meaning.

    (2 - 4 marks)

8. Transformations:
    a) Be familiar with the graphs of the core

       functions x^2, x^3, x^4, $\sqrt{x}$, $|x|$, and $\dfrac{1}{x}$.

    b) Graph a variation of the above using transformations. This may involve completing the square. <u>Do only one transformation at a time, each on a separate graph with proper labeling and the reason given</u>.

    (3 - 5 marks)

9. Analyze a function and be able to identify the domain and/or range of a function.

    (2-5 marks)

Test 2: Polynomial Functions, Conics and Combinations, Composite and Inverse Functions

    (35 - 40 marks)

1. Be able to write the equation of a circle, ellipse, parabola or hyperbola in standard or graphing form and graph the conic. Note: we omit the equation of the directrix and foci of the conics.

    (3-7 marks)

2. Given the component functions $f(x)$ and $g(x)$, calculate and simplify $f \circ g$ (x), or decompose an expression of the form $f \circ g$ (x), into its component functions.   (2 - 3 marks)

3. Find the inverse of a function, using algebra.

    (2 - 4 marks)

4. Find the vertex (by completing the square) and intercepts of a quadratic function (parabola) and graph.

    (2 - 5 marks)

5. Sketch a polynomial function, taking into account the maximum number of **direction changes**, applying the **leading coefficient test** for how the graph enters and leaves the page, testing for **symmetry**, and finding the **intercepts.**   (2 - 5 marks)

6. Use synthetic division and/or long division to find the quotient and remainder when a polynomial is divided by $x - r$ or $ax - r$.   (2-3 marks)

7. Use the Remainder Theorem to find the remainder w... a polynomial is divided by an expression of the form $x - r$ or $ax - r$.   (2-3 marks)

8. List all possible rational zeros of a certain polynomia... *asked this question, do not check to see if any actually work or not.*   (0-1 mark)

9. Solve a polynomial equation of degree 3 or 4, as we ... in class. Real zeros only.

    (2 - 5 mar...

10. Sketch a rational function, as we did in class. Indica... domain, intercepts, vertical and horizontal asymptotes, ... symmetry (if any).   (3 - 7 mar...

Test 3: Logarithms, Exponential Functions and Trigonometry Part I (35 - 40marks)

1. Using the method mentioned in test 1, item 8, graph ... transformations of the core functions: $\log_b x$, b^x, e^x, l...

    (3 -5 mark...

2. Combine a sum or difference of expressions involvin... logarithms into a single expression, and vice-versa.

    (1 or 2 mar...

3. Solve a logarithmic equation. **Note restrictions!**

    (2 - 4 mar...

4. Solve an exponential equation using logarithms. **Not... restrictions!**

    (2 - 4 mark...

5. Calculate a logarithm or exponential expression with... using a calculator.

    (2-3 marks...

6. Applications: 1 or 2 questions chosen from the following. *You will need to know the formulas as well.*

    - Population growth: $P = P_0 e^{kt}$
    - Compound interest:
        - Regular: $A = P(1+\dfrac{r}{n})^{nt}$
        - Continuous: $A = Pe^{rt}$
    - Richter scale: $R = \log(\dfrac{I}{I_0})$
    - Radioactive decay: $P = P_0 e^{kt}$, $k < 0$

COURSE OUTLINE FOR MATH 115 Spring /07

Instructor: Rich Tschritter, Ewing-268

Text: Precalculus, Seventh Edition, by Larson & Hostetler
 Calculator: Scientific- Sharp EL-531W

CHAPTER A: APPENDIX A Review

#	Text	Time	
1	A.3-4	2	Rational Expressions
2	A.5	1	Solving Equations
3	A.6	1	Solving Inequalities

CHAPTER 1: FUNCTIONS AND THEIR GRAPHS

#	Text	Time	
4	1.3	1	Functions, Linear Functions in Two Variables
			TAKE-HOME TEST # 1
5	1.4	1	Functions
6	1.5,1.6	1	Analyzing Graphs of Functions, Parent Functions
	1.7	1	Transformations of Functions
		1	TEST 1, Lessons 1 to 6

#	Text	Time	
7	10.2,2.1	1	Parabolas, **ignore focus and directrix**
8	10.3	1	Ellipse, **ignore foci and eccentricity**
9	10.4	1	Hyperbola, **ignore foci and eccentricity**
10	1.8	1	Combinations of Functions, Composite Functions
11	1.9	1	Inverse Functions
			TAKE-HOME TEST #2

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         14 hours

CHAPTER 2: POLYNOMIAL AND RATIONAL FUNCTIONS

#	Text	Time	
12	2.2	1	Polynomial Functions of Higher Degree
13	2.3	1	Polynomial and Synthetic Division
14	2.5	2	Zeros of Polynomial Functions
15	2.6	2	Rational Functions
		1	TEST 2, Lessons 7 to 15

CHAPTER 3: EXPONENTIAL AND LOGARITHMIC FUNCTIONS

#	Text	Time	
16	3.1	1	Exponential Functions and Their Graphs
17	3.2	2	Logarithmic Functions and Their Graphs
18	3.3	1	Properties of Logarithms
19	3.4	1	Exponential and Logarithmic Equations
20	3.5	3	Exponential and Logarithmic Models
			Take-Home-Test #3

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         15 hours

6. Grading System

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
95-100	A+		9
90-94	A		8
85-89	A-		7
80-84	B+		6
75-79	B		5
70-74	B-		4
65-69	C+		3
60-64	C		2
50-59	D		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** or 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.

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** for information on conversion to final grades, and for additional information on student record and transcript notations.

7. 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.

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.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED