



**School of Arts & Science
MATHEMATICS DEPARTMENT**

**MATH 185-01
Technical Mathematics 1
2006Q1**

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

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:	Dr. Peter J. Trushel		
(b)	Office Hours:	by appointment		
(c)	Location:	Room 151 CBA		
(d)	Phone:	370 - 4490	Alternative Phone:	
(e)	Email:	trushel@camosun.bc.ca		
(f)	Website:	http://trushel.disted.camosun.bc.ca/math185		

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. Determine the sum, difference, and dot product (inner product) of two vectors. Determine the opposite of a vector. Determine variable components so that two given vectors are equal. Multiply a vector by a scalar.
2. Use the inner product to determine the length of a vector. Geometrically add and subtract vectors. Interpret geometrically the length of vector, scalar multiple of a vector, and opposite of a vector. State and use the properties of inner products.
3. Use inner products to determine the angle between vectors, the projection of vector **b** upon vector **a**, and the area of the parallelogram determined by two vectors.
4. Determine the dimension of a matrix. State and use the axioms of matrices. Add, subtract, and multiply two matrices. Multiply a matrix by a scalar.
5. Determine the inverse of a matrix by the Gauss-Jordan Method and by the Adjoint Matrix method.
6. Solve linear systems using the augmented matrix method, Cramer's Rule and by using inverse matrices.
7. Graph points and vectors in three-dimensions. Apply vector operations to three-dimensional vectors. Calculate the dot and cross product of three-dimensional vectors. Use dot products to find angles between three-dimensional vectors. Use the cross product to find the areas of triangles, parallelograms, and the volume of a pyramid.
8. Find the equation of a plane given a point on the plane and the normal to the plane. Find the equation of a plane given three points on the plane. Find the

distance from a point to a plane. Find the equation of a line in three space given a point on the line and a vector parallel to the line. Find the equation of a line given two points on the line. Find the equation of a line in vector, scalar parametric, and standard form. Find the equation of the line of intersection of two planes. Find the distance from a point to a line. Find the distance between two lines.

9. Identify and employ the matrices for reflection, projection, counter clockwise rotation, and dilation and contraction operators in the R^2 and R^3 .
10. Use linear algebra to construct equations of lines through 2 points, circles through 3 points, and a general conic through 5 points.
11. Take limits and derivatives of functions using the limit definition. Find the slope of the tangent line to a curve. Use derivatives to determine velocity, acceleration, and rates of change of one variable with respect to another.
12. Use the power rule, chain rule, product, quotient rule, and implicit differentiation to differentiate polynomial functions, trigonometric functions, logarithm functions and exponential functions.
13. Find tangents and normal to given functions. Solve problems involving related rates, curve sketching, and applied maximum and minimum problems. Find velocity and acceleration for parametrically defined curves.

3. Required Materials

(a)	Texts	Trushel, P. J., <i>Topics in Linear Algebra for Math 185</i> , Camosun College, revised June 2005. Washington, Allyn J., <i>Basic Technical Mathematics with Calculus (Metric Version)</i> , 8th Edition, Addison-Wesley Publishing Company.
(b)	Other	Recommended Calculator Texas Instruments TI-89 or TI-89 Titanium

4. Course Content and Schedule

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

Organization

In-class workload: 5 hours lecture
Out-of-class workload: 5 to 10 hours per week

Prerequisites:	Math 115 or 179 or a B in either Math 12 or an A in Applications of Math 12 or assessment.
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5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

4 Term Tests: 50% of Final Mark
Final Exam: 50% of Final Mark

Term Test Dates

Term-Tests will be held in your classroom for all sections on the following Tuesdays. Tests will be one hour and run from **10:25 am to 11:25 am** or from **11:30 am to 12:30 pm** depending on your normal class time.

10 October, 2006

Test 1

24 October, 2006	Test 2
7 November, 2006	Test 3
21 November, 2006	Test 4

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	<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 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.

Course Outline

Linear Equations and Linear Systems

hours	section (week)	Topic
read	1 (1)	Linear Equations
1	2 (1)	Linear Systems
2	3 (1)	Cramer's rule for Linear Systems

Vectors

hours	section (week)	Topic
1	4 (1)	Vector Operations and Vector Spaces
1	5 (1)	Inner Product
1	6 (2)	Properties and Applications of the inner product

Matrices and Applications

hours	section (week)	Topic
1	7 (2)	Matrices and Matrix Algebra
2	8 (2)	Solving Systems Using Augmented Matrices
1	9 (2)	Matrices and Matrix Multiplication
		Thanksgiving Day 9 October 2006
1	class (3)	Test #1 10 October, 2006
2	10 (3)	The Inverse of a Matrix
2	11 (3, 4)	Solving Linear Systems by Inverse Matrices

Three-Dimensional Geometry and Vectors

hours	section (week)	Topic
2	12 (4)	Three-Dimensional Vectors
2	13 (4)	Planes and Lines in 3 Space

Applications

hours	section (week)	Topic
2	14 (5)	Linear Transformations and Operators in the Plane and in Three Space
1	15 (5)	Least Squares Solutions
1	16 (5)	Constructing Curves and Surfaces through Specified Points
1	class (5)	Test #2 24 October, 2006

The Derivative

hours	section (week)	Topic
1	Wash 23-1 (6)	Limits
1	Wash 23-2 (6)	The Slope of a Tangent to a Curve
2	Wash 23-3 (6)	The Derivative
1	Wash 23-4 (6)	Instantaneous Rate of Change
1	class (7)	Test #3 7 November, 2006
1	Wash 23-5 (7)	Derivatives of Polynomials
1	Wash 23-6 (7)	Derivatives of Products and Quotients
1	Wash 23-7 (7)	Derivative of a Power of a Function and the Chain Rule
2	Wash 23-8 (7 & 8)	Differentiation of Implicit Functions
		Remembrance Day 13 November 2006

Class Outline (continued)

Applications of the Derivatives

hours	section (week)	Topic
1	Wash 24-1 (8)	Tangents and Normals
1	Wash 24-2 (8)	Newton's Method for Solving Equations
1	Wash 24-3 (8)	Curvilinear Motion
2	Wash 24-4 (9)	Related Rates
1	class (9)	Test #4 21 November, 2006
1	Wash 24-5 (9)	Using Derivatives in Curve Sketching
1	Wash 24-6 (9)	More on Curve Sketching
2	Wash 24-7 (10)	Applied Maximum and Minimum Problems

Differentiation of Transcendental Functions

hours	section (week)	Topic
1	Wash 27-1 (10)	Derivatives of the Sine and Cosine Functions
2	Wash 27-2 (10)	Derivatives of the Other Trigonometric Functions
2	Wash 27-5 (11)	Derivatives of the Logarithmic Function
2	Wash 27-6 (11)	Derivatives of the Exponential Function

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21. Find the equation of a plane given a point on the plane and the normal to the plane. Find the equation of a plane given three points on the plane. Find the distance from a point to a plane. Find the equation of a line in three space given a point on the line and a vector parallel to the line. Find the equation of a line given two points on the line. Find the equation of a line in vector, scalar parametric, and standard form. Find the equation of the line of intersection of two planes. Find the distance from a point to a line. Find the distance between two lines.
22. Identify and employ the matrices for reflection, projection, counter clockwise rotation, and dilation and contraction operators in the \mathbb{R}^2 and \mathbb{R}^3 .
23. Use linear algebra to construct equations of lines through 2 points, circles through 3 points, and a general conic through 5 points.
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