



School of Arts & Science  
MATHEMATICS DEPARTMENT

MATH 189-01  
Technical Mathematics 3  
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 or posted		
(c)	Location:	Room CBA 151 Interurban Campus		
(d)	Phone:	(250) 370-4490	Alternative Phone:	
(e)	Email:	<a href="mailto:trushel@camosun.bc.ca">trushel@camosun.bc.ca</a>		
(f)	Website:	<a href="http://trushel.disted.camosun.bc.ca/math189">http://trushel.disted.camosun.bc.ca/math189</a>		

### 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. Use the Addition Rule and the Addition Rule for Non-disjoint Sets, the Multiplication Rule, factorials, permutations, and combinations in the statement and solution of counting problems.
2. Use the Addition Rule, Multiplication Rule, Contingency Tables, Probability Trees, and the Rules of Probability and of Conditional Probability to state and solve probability problems. Determine whether events are independent or dependent, and whether events are mutually exclusive.
3. Produce a stem and leaf plot, Pie Chart, Histogram, Frequency Polygon, Relative Frequency Polygon and Ogive for given data.
4. Find the Arithmetic Mean, Median, and Mode of raw data. Use the weighted mean formula to find the Arithmetic Mean. Use the probability formula  $\bar{x} = \sum P(x) \cdot x$  to find the Arithmetic Mean of data represented in a frequency table.
5. Find the Population and Sample Variance and Standard Deviation of raw data, weighted data and data presented in a frequency table.
6. Apply the Empirical Rule or Tchebyshev's Theorem to make a table showing the expected percentage of scores, the actual number of scores, and actual percentage of scores which fall within one, two, and three standard deviations of the mean.
7. Use the Expected Value formula to find the Population and Sample Variance and Standard Deviation of weighted data, and of probability distributions. Determine the expected value in application problems.

8. Apply the Binomial Probability Formula to the solution of statistics problems. Determine the mean, variance, and standard deviation of any binomial Distribution. Determine when the Binomial Distribution is appropriate for the solution of statistics problems.
9. Calculate the mean, variance, and standard deviation of the Poisson distribution. Solve problems involving the calculation of Poisson probabilities. Identify when it is appropriate to use the Poisson distribution as an approximation to the binomial distribution, and under appropriate conditions, use the Poisson distribution as an approximation to the binomial distribution.
10. Use the Standard Normal Table to solve standard normal problems. Use z-scores to compare results from distributions with different means and standard deviations. Use the Standard Normal Table to solve non-standard normal problems by converting them to standard normal problems.
11. Determine a point estimate for the mean. For given sample or population data, determine 90%, 95%, and 99% confidence intervals for the mean. Use the Central Limit Theorem to estimate probabilities that means will be in certain intervals. Determine the size of a sample required for a given degree of confidence.
12. For given sample or population data, use standard chi-square tables to determine 90%, 95%, and 99% confidence intervals for the variance, and approximate confidence intervals for the standard deviation.
13. Determine a constant  $k$  so that  $y = kf(x)$  is a probability density function on the interval  $[c, d]$ . Use the expected value formulas to find the mean, variance, and standard deviation of a given continuous probability distribution. Solve problems that involve calculating probabilities using continuous, uniform, and exponential distributions. Develop and use the formulas for the mean, variance, and standard deviation of the uniform and exponential distributions.
14. Given  $(x, y)$  data points, determine the regression line (least squares line), and find and interpret the coefficients or correlation and determinations.
15. Given  $(x, y)$  data points, determine least squares curve of the form  $y = a + bf(x)$  or of the form  $y = Be^{kx}$ . Use least squares to fit linear, quadratic, and cubic curves to given data points. Use regression curves to predict future results.
16. Use the techniques of Separation of Variables and Integrable Combinations to solve linear first order and first degree DEs. Use the Linear Differential Equation of First Order formula to solve linear first order and first degree DEs.
17. Solve second order linear constant coefficient homogeneous and non-homogeneous DE's. State and solve elementary application problems involving second order linear constant coefficient homogeneous and non-homogeneous DE's.
18. Use eigenvalues to solve Systems of Linear First-Order Differential Equations.
19. Recognize and solve the second-order Euler equation by the auxiliary equations method and by the eigenvalue method.
20. Use Euler's Method and the Runge-Kutta Method to approximate the solution to DEs by numerical methods.
21. Use calculators and computers for solving equations and using applications as noted above.

### 3. Required Materials

(a)	Texts	<p>Stats: Trushel, Peter J. and Chi-Ming Leung, <i>Math 189 Statistics</i>, Camosun College bookstore 2005.</p> <p>DES: Trushel, Peter J., <i>Differential Equations Supplemental Material</i>, Camosun College bookstore 2005.</p> <p>Wash: Washington, Allyn J., <i>Basic Technical Mathematics with Calculus (Metric Version)</i>, 7th or 8th Edition, Addison-Wesley Publishing Company.</p>
(b)	Other	<p><b>Recommended Calculator</b>  <b>Texas Instruments TI-89 or TI-89 Titanium</b></p>

#### 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 187 or (Math 175, Math 101, and Math 110)

##### Math 189 Outline

Statistics and Probability Topics

Hours	Reference (week)	Topic
2	stats 1 (1)	Counting Techniques
2	stats 2 (1)	Introduction to Probability
1	stats 3 (1)	Introduction to Statistics
2	stats 4 (2)	Pictures of Data
1	stats 5 (2)	Measures of Central Tendency
2	stats 6 (2)	Measures of Variation
1	in class (3)	<b>Test 1 13 October, 2006</b> <b>Thanksgiving 9 October, 2006</b>
1	stats 7 (3)	Interpretations of Standard Deviation
1	stats 8 (3)	Expected Value
2	stats 9 (3, 4)	Binomial Distribution
2	stats 10 (4)	Poisson Distribution
2	stats 11 (4)	The Normal Probability Distribution
1	in class (5)	<b>Test 2 27 October, 2006</b>
2	stats 12 (5)	Sampling Distributions, Point Estimates, Confidence Intervals for $\mu$
2	stats 13 (5)	Sampling Distributions, and Confidence Intervals for Variance
2	stats 14 (6)	Continuous Probability Density Functions
2	stats 15 (6)	Linear Regression
1	stats 16 (6)	Non-linear Regression
1	in class (7)	<b>Test 3 10 November, 2006</b>

Differential Equations

Hours	Reference (week)	Topic
1	Wash 30-1 (7)	Solutions of Differential Equations
1	Wash 30-2 (7)	Separation of Variables
1	Wash 30-3 (7)	Integrable Combinations
2	Wash 30-4 (7 & 8)	The Linear Differential Equation of the First Order and DES 1
		<b>Remembrance Day 13 November, 2006</b>
2	Wash 30-5 (8)	Elementary Applications
1	Wash 30-6 (8)	Second-Order Homogeneous Equations and DES 2
1	in class (9)	<b>Test 4 24 November, 2006</b>
1	Wash 30-7 (9)	Auxiliary Equations with Repeated or Complex Roots
2	Wash 30-8 (9)	Solutions of Non-homogeneous Equations
2	Wash 30-9 (9, 10)	Applications of Higher-Order Equations and DES 3
2	DES 4 (10)	Systems of Linear First-Order Differential Equations and Eigenvalues
2	DES 5 (10)	Euler's Equation

2	DES 6 (11)	Euler Method
2	DES 7 (11)	Runge-Kutta Method

## 5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

### Assessment

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

Final Exam: **50% of Final Mark**

### Term Test Dates

Term-Tests will be held in your classroom on the following days. Tests will be one hour and 20 minutes and will run from 8:00 am to 9:20 pm.

13 October, 2006	Test 1
27 October, 2006	Test 2
10 November, 2006	Test 3
24 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](http://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.

<b>IP</b>	<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.
<b>CW</b>	<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](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.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED