CAMOSUN COLLEGE	***School of Arts & Science*** ***MATHEMATICS DEPARTMENT*** **MATH 189-X01** **Technical Mathematics 3** **2010 Q1**

COURSE OUTLINE

1. Instructor Information

Instructor:	Raymond Lai
Office Hours:	Monday to Thursday: 10:30 am – 12:20 pm By appointment
Office	CBA 152
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2. Course Description

Topics include: probability; frequency tables; probability distributions: discrete and continuous; curve fitting: linear regression, nonlinear regression; ordinary differential equations: first order, linear higher order, numerical methods.

Offered: Quarter 1 and Quarter 3
Credit: 3
In-Class Workload and Format: 5 hours of lecture/week for 11 weeks
Out-of-Class Workload: 5-10 hours/week (more for students with weak background)
Prerequisites: MATH 187 **or** MATH 175 **or (**MATH 101 and MATH 110).

3. Intended Learning Outcomes

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 $\overline{x} = \sum P(x) \cdot x$ 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 of correlation and determination.
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.

4. Required Materials

Text: (Required) Trushel, Peter J. and Chi-Ming Leung, *Intermediate Statistics*, Camosun College bookstore 2006.

(Optional) Washington, Allyn J., Basic Technical Mathematics with Calculus (Metric Version), 9th Edition, Addison-Wesley Publishing Company.

Scientific calculator is required; graphing calculator (such as TI-89) is optional and is allowed in term tests and final examination.

5. Course Content and Tentative Schedule

Differential Equations	17 hours	Washington Sections 31.1 – 31.10,
Euler Equation	1 hour	Handout
Statistics	21 hours	Trushel Sections 1 – 10, 13 – 18

Lecture	39 hours
Tests	4 hours
Leeway (including help session, review and holiday)	12 hours
Total	55 hours

6. Basis of Student Assessment (Weighting)

- 3 Assignments (10%)
  Assignments are due at the beginning of class – 50% penalty if turned in late.
  Marked solutions will be posted online at the class's website.

Assignment	Due Date	Questions to hand in
1	27 Oct	
2	24 Nov	
3	8 Dec	

- 2 Tests (40%) –
  Tentatively on: 3 Nov (and 10 Nov), 2 Dec (and 8 Dec).
  Thorough understanding of the examples discussed in class and the homework exercises will be essential for success on the term tests. Complete solutions will be posted online at the class's website.

- Comprehensive Final Exam (50%) during the week of 13 Dec – 17 Dec.
  As stated in the college calendar, "Students are expected to write tests and final examinations at the scheduled time and place. … Exceptions, due to emergency circumstances, such as unavoidable employment commitments, health problems, or unavoidable family crisis, require approval of the appropriate instructor. Holidays or scheduled flights are not considered to be emergencies. The student may be required to provide verification of the emergency circumstances."

Guarantee Pass Option:

If your term work is 50% (or better) AND your final exam is 60% (or better), then you are guaranteed to have a course grade of C or better – your course grade will be the higher of 60% and (50% term work + 50% final exam)

7. Course Policy

- Students are required to have their mobile phones either set on vibrate or turned off while attending class and writing term tests and final examination.
- Students are responsible for announcements made in class (check with your fellow students if you have to miss a class).

8. 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		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.

Note: A course with a "D" or "F" grade cannot be used as a prerequisite.

9. 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.

How to do well in the course and where to get help

1. Do not skip classes. There will be problem solving techniques discussed in class **not covered** in the assignments.
2. Start working on the exercises as soon as we finish a section.
3. It is important to understand the principles involved rather than to memorize a method of solution – try variations of questions.
4. Studying in groups is an efficient way to learn mathematics; however, make sure you can solve problems yourself.
5. Extra help available from assistant at the Math Lab located at Technologies Centre (TEC) Room 142 (phone: 370-4492). This drop-in centre is freely available for your use to work on math homework and to seek help from the tutor on staff (see hours posted on door).

Tentative Schedule (W: Washington; T: Trushel)

Week (Dates)	Monday (1 hr)	Tuesday (2 hrs)	Wednesday (1 hr)	Thursday (1 hr)
1 (27/9/10-1/10/10)	**27-Sept** (W) 31.1	**28-Sept** (W) 31.2	**29-Sept** (W) 31.3	**30-Sept** (W) 31.4
2 (4/10/10-8/10/10)	**4-Oct** (W) 31.4	**5-Oct** (W) 31.5	**6-Oct** (W) 31.6	**7-Oct** (W) 31.6
3 (11/10/10-15/10/10)	**11-Oct** **No Class** **(Thanksgiving)**	**12-Oct** (W) 31.6, 31.7	**13-Oct** (W) 31.8	**14-Oct** (W) 31.9
4 (18/10/10-22/10/10)	**18-Oct** (W) 31.9	**19-Oct** (W) 31.10	**20-Oct** Euler DE	**21-Oct** (T) 1
5 (25/10/10-29/10/10)	**25-Oct** (T) 1	**26-Oct** (Hw 1 Help Session)	**27-Oct** (T) 2 **(Hw 1 due)**	**28-Oct** (T) 2
6 (1/11/10-5/11/10)	**1-Nov** (Test 1 Review)	**2-Nov** (T) 3, 4	**3-Nov** **(Test 1A)**	**4-Nov** (T) 5
7 (8/11/10-12/11/10)	**8-Nov** (T) 6	**9-Nov** (T) 6,7	**10-Nov** **(Test 1B)**	**11-Nov** **No Class** **(Remembrance Day Observed)**
8 (15/11/10-19/11/10)	**15-Nov** (T) 7	**16-Nov** (T) 8	**17-Nov** (T) 9	**18-Nov** (T) 10
9 (22/11/10-26/11/10)	**22-Nov** (T) 13	**23-Nov** (Hw 2 Help Session)	**24-Nov** (T) 14 **(Hw 2 due)**	**25-Nov** (T) 15
10 (29/11/10-3/12/10)	**29-Nov** (T) 16	**30-Nov** (T) 17, 18	**1-Dec** (Test 2 Review)	**2-Dec** **(Test 2A)**
11 (6/12/10-10/12/10)	**6-Dec** **Final Review**	**7-Dec** (Hw 3 Help Session)	**8-Dec** **(Test 2B)** **(Hw 3 due)**	**9-Dec** **Final Review**
12 (13/12/10-17/12/10)	**13-Dec** **Exam Week**	**14-Dec** **Exam Week**	**15-Dec** **Exam Week**	**16-Dec** **Exam Week**