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	School of Arts & Science *MATHEMATICS DEPARTMENT* **MATH 189-X01** **Technical Mathematics 3** **2012 Q3**

COURSE OUTLINE

1. Instructor Information

Instructor:	Raymond Lai
Office Hours:	Monday to Friday: 10:30 am – 12:20 pm By appointment
Office	CBA 152
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Website:	http://faculty.camosun.ca/raymondlai/

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 101 **or** MATH 187 **or** MATH 175

3. Required Materials

Text:

(Optional) Washington, Allyn J., Basic Technical Mathematics with Calculus (Metric Version),

9th Edition, Addison-Wesley Publishing Company.

(Optional) Trushel, Peter J. and Chi-Ming Leung, Intermediate Statistics, Camosun College bookstore

2006.

Scientific calculator is required in term tests and final examination (except in calculator-free

sections, if any); graphing calculator (such as TI-89) is not allowed.

4. Intended Learning Outcomes

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

1. Use techniques from combinatorics to solve counting problems.
2. Solve probability and conditional probability problems using appropriate methods.
3. Depict raw data graphically using a variety of presentations.
4. Calculate the mean, median, mode, variance and standard deviation of a raw data set and data given in a frequency table.
5. Make predictions regarding the distribution of a data set using the Empirical Rule and Tchebyshev's Theorem.
6. Find the expected value and standard deviation given the probability distribution of a discrete random variable and solve application problems using these results.
7. Identify when a random variable has a binomial or Poisson distribution, calculate its mean and standard deviation and solve application problems.
8. Use the Poisson distribution as an approximation to the binomial distribution when appropriate.
9. Use the Standard Normal Table to solve problems involving random variables that have a normal distribution.
10. For given sample or population data, determine a confidence interval for the mean and make appropriate inferences using the Central Limit Theorem.
11. For given sample or population data, determine a confidence interval for the variance, and approximate a confidence interval for the standard deviation.
12. Calculate the mean, variance, and standard deviation of a given continuous probability distribution.
13. Solve problems that involve calculating probabilities using continuous, uniform, and exponential distributions.
14. Determine the regression line (least squares line) from a raw data set, and find and interpret the coefficients of correlation and determination.
15. Use least squares to fit quadratic, cubic and exponential curves to a given raw data set and use these curves to predict future results.
16. Use a variety of techniques to solve problems and applications involving linear first and second order differential equations.
17. Use eigenvalues to solve Systems of Linear First-Order Differential Equations.
18. Recognize and solve the second-order Euler equation.
19. Use Euler's Method and the Runge-Kutta Method to approximate the solution to a differential equation.

5. Course Content and Tentative Schedule

<u>Differential Equations</u>   (Reference: Washington)

Section 1   Solutions of Differential Equations (Ref: Section 31.1)

Section 2   Separation of Variables (Ref: Section 31.2)

Section 3   Integrating Combinations (Ref: Section 31.3)

Section 4   First Order Linear Differential Equations (Ref: Section 31.4)

Section 5   Numerical Solution: Euler's Method and Runge-Kutta (RK4) Method
                   (Ref: Section 31.5)

Section 6   Applications of First Order Differential Equations (Ref: Section 31.6)

Section 7   Higher Order Homogeneous Linear Differential Equations
                   (Ref: Sections 31.7, 31.8)

Section 8   Higher Order Nonhomogeneous Linear Differential Equations (Ref: Section 31.9)

Section 9   Applications of Higher Order Linear Differential Equations (Ref: Section 31.10)

Section 10 Cauchy-Euler Equation

<u>Statistics and Probability</u>   (Reference: Trushel)

Section 11 Counting Techniques (Ref: Section 1)

Section 12 Introduction to Probability (Ref: Section 2)

Section 13 Introduction to Statistics (Ref: Section 3)

Section 14 Pictures of Data (Ref: Section 4)

Section 15 Measures of Central Tendency (Ref: Section 5)

Section 16 Measures of Variation (Ref: Section 6)

Section 17 Interpretation of Standard Deviation (Ref: Section 7)

Section 18 Expected Value (Ref: Section 8)

Section 19 Binomial Distribution (Ref: Section 9)

Section 20 Poisson Distribution (Ref: Section 10)

Section 21 Continuous Probability Density Functions (Ref: Section 13)

Section 22 Normal Distribution (Ref: Section 14)

Section 23 Estimate of Population Mean (Ref: Section 15)

Section 24 Estimate of Population Variance (Ref: Section 6)

Section 25 Linear Regression (Ref: Section 17)

Section 26 Non-Linear Regression (Ref: Section 18)

Lectures, Reviews, Help Sessions	Tests	Holiday	**Total**
49 hours	3 hours	3 hours	**55 hours**

6. Basis of Student Assessment (Weighting)

To get a C or better in the course, you must get 50% or higher in the final exam *and* have an overall average of 60% or higher; your numerical grade will be computed using the following two components:

- 3 Tests (total 50%)
    - Tentatively on 13 April (10%), 4 May (20%), 25 May (20%)
    - Some tests may have a calculator free section that does not allow use of calculator
    - Thorough understanding of the examples discussed in class and the homework exercises will be essential for success on the term tests.
    - Solutions will be posted online at the class's website.
    - There is no makeup for missed test (except for documented medical reasons)
- Comprehensive Final Exam (50%)
    - During the week of 18 June – 22 June.
    - 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."

which is then converted to a letter grade using the standard Camosun grade scale (see Grading System (8) below).

There is one exception: if your term work is at least 50% *and* you received 60% or higher in the final exam, then you will receive a C in the course *even if* your overall average is under 60%.

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. Studying in groups is an efficient way to learn mathematics; however, make sure you can solve problems yourself.
3. It is important to understand the principles involved rather than to memorize a method of solution – try variations of questions.
4. 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 the door).