CAMOSUN COLLEGE	**School of Arts & Science** **MATHEMATICS DEPARTMENT** **MATH 252** **Applied Differential Equations** **Quarter or Semester/Year**

COURSE OUTLINE

The course description is online @ http://camosun.ca/learn/calendar/current/web/math.html

Ω *Please note: the College electronically stores this outline for five (5) years only.*
*It is **strongly recommended** you keep a copy of this outline with your academic records.*
You will need this outline for any future application/s for transfer credit/s to other colleges/universities.

1. Instructor Information

(a)	Instructor:	Bogdan Verjinschi		
(b)	Office Hours:	M to F :12:30-1:20 a.m.& M, W, F : 10:30-11:30 a.m.		
(c)	Location:	CBA 151		
(d)	Phone:	370-4490	Alternative Phone:	
(e)	Email:	verjinschi@camosun.bc.ca		
(f)	Website:	http://verjinschi.disted.camosun.bc.ca		

2. Intended Learning Outcomes

(No changes are to be made to these Intended Learning Outcomes as approved by the Education Council of Camosun College.)

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

1. Classify a differential equation (DE) by type (ordinary differential equation ODE vs. partial differential equation PDE), order, and linearity.
2. Verify an implicit or explicit solution of an ODE/initial value problem (IVP).
3. Determine the existence and uniqueness of a solution of a first-order IVP.
4. Model real-life phenomenon with linear/non-linear DE (for example, vibration problems such as the spring-mass system, population dynamics [logistic equation], radioactive decay, Newton's law of cooling/warming, spread of a disease, chemical reactions, mixture problems, draining a tank – Torricelli's law, series circuits, falling bodies with/without air resistance, slipping chain).
5. Model real-life phenomenon with a system of linear or nonlinear DE's (for example, radioactive series, mixture problems, population dynamics (predator-prey model, competition model), electrical networks.
6. Sketch approximate solution curves for a first-order IVP using a direction field.
7. Sketch solution curves of an autonomous first-order DE by drawing and analyzing the one-dimensional phase portrait.
8. Solve various types of first-order DE: separable DE, linear DE (using integrating factor), exact DE and non-exact DE (by making it exact), homogeneous DE of a certain degree, Bernoulli DE.
9. Determine the existence and uniqueness of a solution of a n^{th}-order IVP.
10. Solve 2^{nd}-order linear homogeneous and nonhomogeneous DE using the method of reduction of order.
11. Solve higher-order linear homogeneous and nonhomogeneous DE with constant coefficients.
12. Solve 2^{nd}-order nonhomogeneous DE using the method of variation of parameters.
13. Solve Cauchy-Euler equations.
14. Solve systems of linear equations.
15. Sketch trajectories of a system of two linear first order DE by drawing and analyzing the two-dimensional phase portrait.
16. Classify a point for a DE as an ordinary point, regular singular point, or irregular singular point.
17. Find power series solution of a DE about an ordinary point.
18. Find series solution of a DE about a regular singular point.
19. Apply the Frobenius Theorem to find series solution of a DE about a regular singular point.
20. Use a Laplace transform and its properties to solve an IVP.

3. Required Materials

(a) Texts Dennis G Zill, A First Course in Differential Equations with Modeling Applications, 9th Edition, Brooks/Cole, 2009

(b) Other

4. Course Content and Schedule

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

Text	Hours	Topic
1.1	1	Definitions and Terminology
1.2	1	Initial-Value Problems
1.3	*Optional*	*Differential Equations as Mathematical Models*
Total hours	**2**	

First-Order Differential Equations

Text	Hours	Topic
2.1	*Optional*	*Solution Curves*
2.2	1	Separable Variables
2.3	2	Linear Equations
2.4	1	Exact Equations
2.5	1	Solutions by Substitutions
Total hours	**5**	

Modeling with First-Order Differential Equations

Text	Hours	Topic
3.1	1	Linear Equations
Total hours	**1**	

Higher Order Differential Equations

Text	Hours	Topic
4.1	2	Preliminary Theory
4.2	2	Reduction of Order
4.3	1	Homogeneous Linear Equations with Constant Coefficients
4.4	2	Undetermined Coefficients---Superposition Approach
4.6	2	Variation of Parameters
4.7	Optional	Cauchy-Euler Equations
Total hours	**9**	

Modeling with Higher-Order Differential Equations

Text	Hours	Topic
5.1.1	1	Free Undamped Motion
5.1.2	2	Free Damped Motion
5.1.3	1	Driven Motion
5.1.4	1	Series Circuits Analogue
Total hours	**5**	

Series Solutions of Linear Equations (5 hours)

Text	Hours	Topic
6.1	3	Solutions About Ordinary Points
6.2	2	Solutions About Singular Points
Total hours	**5**	

Laplace Transform

Text	Hours	Topic
7.1	2	Definition of the Laplace Transform
7.2	2	Inverse Transform and Transforms of Derivatives
7.3	2	Translation Theorems
7.4	3	Additional Operational Properties
7.5	1	Dirac Delta Function
Total hours	**10**	

Systems of Linear First-Order Differential Equations

Text	Hours	Topic
8.1	2	Preliminary Theory
8.2	3	Homogeneous Linear Systems with Constant Coefficients
8.3	2	8.3.2 Variation of Parameters

Total hours 7

5. Basis of Student Assessment (Weighting)

(This section should be directly linked to the Intended Learning Outcomes.)

a)Tests (50%): **4 tests** (**April 23** Friday, M**ay10** Monday **, May 28** Friday**, June 11** Friday).
There is NO makeup (medical excuse must be accompanied by a physician's not

(b) **Final Exam** (50%): There is NO makeup.

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6. Grading System

(No changes are to be made to this section unless the Approved Course Description has been forwarded through the Education Council of Camosun College for approval.)

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	Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite.	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 E-1.5 at **camosun.ca** for 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, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. *(For these courses a final grade will be assigned to either the 3rd course attempt or at the point of course completion.)*
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.

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 the College web site in the Policy Section.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED