



**School of Arts & Science  
MATHEMATICS DEPARTMENT**

**MATH 250B-01  
Intermediate Calculus 2  
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:	Raymond Lai		
(b)	Office Hours:	As announced in the first class (also posted on office door), or by appointment		
(c)	Location:	Centre for Business and Access (CBA) Room 152		
(d)	Phone:	370-4491	Alternative Phone:	
(e)	Email:	<a href="mailto:lai@camosun.bc.ca">lai@camosun.bc.ca</a>		
(f)	Website:	<a href="http://lai.disted.camosun.bc.ca/">http://lai.disted.camosun.bc.ca/</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. Sketch the graph of a function of two variables using contours.
2. Evaluate limits and justify why a limit might not exist.
3. Use differentials to do computations in linear approximation and error analysis.
4. Calculate derivatives using the chain rule for functions of several variables.
5. Calculate partial derivatives implicitly.
6. Solve optimization problems using directional derivatives.
7. Find equations of tangent planes and normal lines to surfaces.
8. Find the relative extrema of a function of several variables.
9. Use the second partials test to determine the nature of relative extrema of a function of two variables.
10. Perform calculations involving the method of least squares.
11. Solve constrained optimization problems using the Lagrange Multiplier method.
12. Evaluate a double integral as an iterated integral.
13. Calculate the area of a plane region and the volume of a solid region using a double integral.
14. Evaluate double integrals in polar coordinates.
15. Calculate the mass, centre of mass and moments of inertia of a planar lamina using double integrals.
16. Find the area of the surface of a solid using a double integral.
17. Find the volume, mass, centre of mass and moments of inertia of a solid region using a triple integral.

18. Evaluate triple integrals in cylindrical or spherical coordinates.
19. Use a Jacobian to change variables in a double or a triple integral.
20. Calculate the curl and the divergence of a vector field.
21. Determine whether a vector field is conservative.
22. Evaluate a line integral, a line integral of a vector field and a line integral in differential form.
23. Perform calculations involving the Fundamental Theorem of line integrals, the concept of independent of path and of conservation of energy.
24. Use Green's Theorem to evaluate a line integral.
25. Represent a surface using a set of parametric equations.
26. Find a normal vector and a tangent plane to a parametric surface and calculate the area of a parametric surface.
27. Evaluate a surface integral as a double integral.
28. Evaluate a surface integral for a parametric surface.
29. Perform calculations using the Divergence Theorem and Stoke Theorem.

### 3. Required Materials

(a)	Texts	R.E. Larson, R.P. Hostetler and B.H. Edwards, <i>Calculus</i> , Eighth Edition, Houghton Mifflin Co., Boston, 2002.
(b)	Other	<b>Calculator Policy</b> Graphing calculator (such as Texas Instruments TI-89) allowed

### 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.)

**Prerequisites**                      MATH 250A

#### *Organization*

In-class workload:            4 hours lecture per week

Out-of-class workload:    5 hours per week (or more for students with weak background)

#### **Assignment**

- A list of suggested exercises from the textbook is provided on the last page. You can find a copy of the solution guide on reserve in the library (it contains complete solution for both odd- and even-numbered exercises).

#### **Quizzes and Term Tests**

- There will be 6 twenty-minute quizzes on the Thursdays of

week 2	week 3	week 5	week 6	week 8	week 9
5 Oct	12 Oct	26 Oct	2 Nov	16 Nov	23 Nov

and 3 sixty-minute term tests on the Thursdays of

week 4	week 7	week 10
19 Oct	9 Nov	30 Nov

- Complete understanding of the examples discussed in class and the suggested exercises in the assignments will be essential for success on the quizzes and the term tests.
- Complete solutions will be posted online at the class's website.

#### **Final Examination**

- The final exam will cover the entire course and will be 3 hours long.

- As stated on page 35 in the current college calendar 2006 – 2007, “students are expected to write tests and final examinations at the scheduled time and place.” Exceptions will only be considered due to **emergency** circumstances as outlined in the calendar. Holidays or scheduled flights are not considered to be emergencies.
- Final examination period December 11 – 15 (specific date, time, and location TBA)

### Course Content

The course will follow the textbook fairly closely, covering the following topics:

#### Chapter 13 – Functions of Several Variables

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- 13.1 Introduction to Functions of Several Variables
  - 13.2 Limits and Continuity
  - 13.3 Partial Derivatives
  - 13.4 Differentials
  - 13.5 Chain Rules for Functions of Several Variables
  - 13.6 Directional Derivatives and Gradients
  - 13.7 Tangent Planes and Normal Lines
  - 13.8 Extrema of Functions of Two Variables
  - 13.9 Applications of Extrema of Functions of Two Variables
  - 13.10 Lagrange Multipliers

#### Chapter 14 – Multiple Integration

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- 14.1 Iterated Integrals and Area in the Plane
  - 14.2 Double Integrals and Volume
  - 14.3 Change of Variables: Polar Coordinates
  - 14.4 Center of Mass and Moments of Inertia
  - 14.5 Surface Area
  - 14.6 Triple Integrals and Applications
  - 14.8 Change of Variables: Jacobians
  - 14.7 Triple Integrals in Cylindrical and Spherical Coordinates

#### Chapter 15 – Vector Analysis

- 15.1 Vector Fields
- 15.2 Line Integrals
- 15.3 Conservative Vector Fields and Independence of Path
- 15.4 Green’s Theorem
- 15.5 Parametric Surfaces
- 15.6 Surface Integrals
- 15.7 Divergence Theorem

Stoke’s Theorem (if time permits)

### 5. Basis of Student Assessment (Weighting)

*(Should be linked directly to learning outcomes.)*

The final grade will be calculated according to the following breakdown:

6 Quizzes	3 Term Tests	Final Exam.
$6 \times 3.33\% = 20\%$	$3 \times 10\% = 30\%$	50%

### 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
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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.
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](http://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.

	Monday	Tuesday	Wednesday	Thursday	Friday
07:00-07:20	Office Hour	Office Hour	Office Hour	Office Hour	Office Hour
07:30-08:20	Office Hour	Office Hour	Office Hour	Office Hour	Office Hour
08:30-09:20	Math 250B(X01) JW109	Math 250B(X01) JW109	Math 250B(X01) JW109	Math 250B(X01) JW109	Office Hour
09:30-10:20	Math 250B(X02) JW109	Math 250B(X02) JW109	Math 250B(X02) JW109	Math 250B(X02) JW109	Office Hour
10:30-11:20					
11:30-12:20	Office Hour	Office Hour	Office Hour	Office Hour	
12:30-13:20	Office Hour	Office Hour	Office Hour	Office Hour	
13:30-14:20	Office Hour	Office Hour	Office Hour	Office Hour	

First Lecture: Monday 25 September 2006

Last day to drop quarter courses (Fee Deadline): Tuesday 10 October 2006

Last day to withdraw without a failing grade: Tuesday 14 November 2006

Last Lecture: Thursday 7 December 2006

No class on: Monday 9 October 2006 (Thanksgiving Day), and  
Monday 13 November 2006 (Remembrance Day)

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

1. Do not skip classes.
2. Start working on the exercises as soon as we finish a section.
3. Studying in groups is an efficient way to learn mathematics; however, make sure you can solve problems yourself.
4. Extra help available from assistant at the Interurban Math Room: 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).
5. 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, Registrar's Office or the College web site at <http://www.camosun.bc.ca>**

6. **Need a tutor/Want to become a tutor? Visit [http://www.camosun.bc.ca/resources/ses/tutors\\_list.php](http://www.camosun.bc.ca/resources/ses/tutors_list.php)**

## Suggested Exercises

Section (Page)	Exercises (Answers for even-numbered exercises within brackets [.] )
13.1 (892)	11(b), 15(b), 21, 35, 53, 71, 89, 90 [True], 91, 92 [True]
13.2 (902)	17, 43, 59, 63, 64 [False], 65, 66 [True], 71
13.3 (912)	9, 39, 47, 55, 65, 103, 104 [True], 105, 106 [True]
13.4 (921)	1, 17, 30 [ $ \Delta r  \leq 0.064$ , $ \Delta \theta  \leq 0.0071$ ], 41, 45
13.5 (929)	3, 5, 21, 23, 33, 39, 53
13.6 (940)	5, 11, 17, 23, 27, 33, 37, 57, 73, 77, 78 [False], 79, 80 [True], 81
13.7 (949)	19, 33, 43, 49
13.8 (958)	9, 11, 25, 55, 63, 64 [False]
13.9 (964)	1, 7, 9, 11, 29
13.10 (974)	13, 19, 23, 33
14.1 (988)	19, 25, 33, 35, 41, 43, 45, 47, 61, 79, 80 [False]
14.2 (997)	15, 19, 27, 39, 75, 76 [True]
14.3 (1006)	15, 25, 31, 41, 53, 54 [True]
14.4 (1015)	13, 21, 35
14.5 (1022)	$8 \left[ \frac{12}{5} \sqrt{3} - \frac{8}{5} \right]$ , 17
14.6 (1032)	3, 21, 23, 25, 27, 35, 37, 47, 55
14.8 (1047)	11, 15, 21, 29
14.7 (1040)	3, 11, 13, 17, 21, 23, 31, 33
15.1 (1063)	37, 41, 43, 55, 61, 69, 71, 73, 75, 89, 90 [True], 91, 92 [False]
15.2 (1075)	9, 17, 21, 37, 41, 57, 81, 82 [False], 83, 84 [False]
15.3 (1086)	13, 15, 21, 23, 29, 35, 37, 39, 47, 48 [True], 49, 50 [False]
15.4 (1095)	7, 15, 19, 23, 27, 35, 37
15.5 (1105)	7, 25, 33, 39
15.6 (1118)	5, 7, 11, 15, 19, 27, 29
15.7 (1126)	3, 5, 7, 9, 11, 13, 15, 17
15.8 (1133)	7, 9, 11, 13, 15, 19, 21