

Math 119 Syllabus

Applied Calculus

Fall 2006

<u>Instructor</u>	Susan Barton GCB 160 D Ext. 3811	<u>Class Time:</u>	M W T H F	2:00 p.m. - 2:50 p.m.
		<u>Office Hours</u>	M, W, F Th	10:05 p.m. - 10 :55 p.m. 8:00 a.m. - 8:50 a.m.
				*** Other times available by appointment
<u>Text</u>	Calculus with Applications 8 nd Edition by Lial, Greenwell, and Ritchey			

<u>Grading</u>	Homework & Quizzes (%)	100 points
	4 Exams @ 100 points each	400 points
	Final Exam (Comprehensive)	<u>200 points</u>
	TOTAL	700 points

<u>Grading Scale</u>	92.5 - 100 % = A	69.5 - 74.4 % = C
	89.5 - 92.4 % = A-	64.5 - 69.4 % = C-
	86.5 - 89.4 % = B+	59.5 - 64.4 % = D+
	82.5 - 86.4 % = B	54.5 - 59.4 % = D
	79.5 - 82.4 % = B-	49.5 - 54.4 % = D-
	74.5 - 79.4 % = C+	Below 49.5 % = F

Regular and **on-time attendance** is important and expected. Please be courteous to the teacher and your fellow students by being on time for class and turning off your cell phone. Attendance may be included in the grading procedures. You, the student, are responsible for any material covered or information given in class during an absence. It is important for you to learn to clearly communicate mathematical ideas so be sure to **show your work** on homework, quizzes and exams in order to receive credit for your thinking. **Quizzes** given during class cannot be made up at a later time.

Most of the **Homework** for this class will be done using MyMathLab computer software. Approximately once a week, class will be held in the Math Lab (GCB 177) in order to use the computers and mathematics software.

Some additional “paper and pencil” problems will be assigned from the textbook. These problems will be collected (at the beginning of class) two class periods after they have been assigned. Be sure to show your work in order to receive full credit. **Late homework** will be accepted (with a penalty of 2 points per day late) until the exam over the material has been given. Your three lowest homework scores (in case you have an emergency this semester) will be dropped at the end of the semester when calculating your homework percentage.

In order for our class discussion to be more productive, it is important for you to read the material in the section to be covered prior to coming to class. Therefore, part of the homework assignment is to read the section(s) to be discussed during the next class period. **Short quizzes** may be given over the reading material.

Exams will be given as shown on the schedule. A missed exam will result in a score of “0” unless prior consent is given by the instructor for a make-up exam. (A word to the wise: make-up exams are **rarely** given.) Please remember that grades are not magically given, they

are EARNED. Please make every effort NOT to fall behind this semester; that has been the down fall for a number of talented students in the past. The class meets four times a week so you will need to make a commitment to several hours of **effective study** EACH day in order to successfully complete the course.

In this course you will have an opportunity to expand upon your knowledge of mathematics. However, gaining knowledge must also go hand in hand with developing a strong code of ethics and integrity. Since one of the conditions of my employment and your attendance at BYU-Hawaii is that we all obey the **Honor Code** in all matters, we must take it very seriously. Remember who you are and what you represent; it will be your first line of defense. Also, as described in the Honor Code, any student who is dishonest in this course, regardless of role or level of participation, will be assigned a grade of “F” in the course and will be referred to the Standards Office for further action.

Title IX of the education amendments of 1972 prohibits sex discrimination against any participant in an educational program or activity that receives federal funds, including Federal loans and grants. Title IX also covers student-to-student sexual harassment. If you encounter unlawful sexual harassment or gender-based discrimination, please contact the Human Resource Services at 780-8875 (24 hours).

Brigham Young University-Hawaii is committed to providing a working and learning atmosphere, which reasonably accommodates qualified persons with disabilities. If you have any disability that may impair your ability to complete this course successfully, please contact the students with Special Need Coordinator, Leilani A'una at 293-3518. Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures. You should contact the Human Resource Services at 780-8875.

Philosophy of the course: **Calculus is one of the greatest achievements** of the human intellect. One of the reasons calculus is so powerful and so useful is because of its extraordinary ability to reduce complicated problems to simple rules and procedures. Herein lies the danger of teaching and learning calculus because **it is easy to turn the subject into the memorization of rules and procedures**. Although it is important to learn the skills and appropriate procedures of calculus, a strong emphasis in this course will be placed on **critical thinking and understanding**. Technology (such as computer software and graphing calculators such as the TI-84 or 86) will be utilized as tools in understanding and working problems. Throughout the course, examples and discussions will encourage you (the student) to think visually, numerically, and analytically in addition to learning the requisite techniques and algorithmic procedures of calculus. **A more detailed list of course objectives may be found on my school web page at soc.byuh.edu/barton.**

Now it is time to have some fun. Let's do some math!

Math 119 Daily Schedule

Aug. 30	Intro., Slopes & Equations of Lines (1.1)	6	The Least Squares Line (1.3)
31	Math Lab	7	Math Lab
Sept. 1	Linear Functions & Applications (1.2)	8	Properties of Funct. (2.1), Trig. Funct. (13.1)

4	Labor Day Holiday	11	Quadratic Functions: Trans. & Reflect. (2.2)

- 13 Polynomials & Rational Functions (2.3)
- 14 Math Lab
- 15 Exponential (2.4) & Logarithmic Functions (2.5)

- 18 Log. Functions (2.5), Growth & Decay Appl. (2.6)
- 20 Math. of Finance (2.6) & Review for Exam
- 21 Math Lab Review for Exam

Sept. 21-22 Exam I (Chs. 1 & 2) Limits (3.1)

- 25 Limits (3.1), Continuity (3.2)
- 27 Rates of Change (3.3)
- 28 Math Lab
- 29 Definition of the Derivative (3.4)

- 2 Graphical Differentiation (3.5)
- 4 Techniques for Finding Derivatives (4.1)
- 5 Math Lab
- 6 Derivatives of Products and Quotients (4.2)

- 11 Derivatives of Exponential Functions (4.4)
- 12 Math Lab
- 13 Derivatives of Logarithmic Functions (4.5)

Oct. 17-18 Exam II (Chs. 3 & 4)

- 19 Increasing & Decreasing Funct. (5.1)
- 20 Relative Extrema (5.2)

- 23 Higher Der., Concavity, & Sec. Der. Test (5.3)
- 25 Curve Sketching (5.4)
- 26 Math Lab
- 27 Curve Sketching (5.4), Absolute Extrema (6.1)

- 30 Applications of Applications (6.2)
- Nov. 1 Further Business Applications (6.3)
- 2 Math Lab
- 3 Implicit Differentiation (6.4)

- Nov. 6 Related Rates (6.5)
- 8 Review for Exam

Nov. 8-9 Exam III (Chs. 5 & 6)

- 10 Antiderivatives (7.1),
Integrals of Trig. Funct. (13.3)

- 13 Substitution (7.2)
- 15 Area and the Definite Integral (7.3)
- 16 Math Lab
- 17 The Fundamental Theorem of Calculus (7.4)

- 20 The Area Between Two Curves (7.5)
- 22 Functions of Several Variables (9.1)
Partial Derivatives (9.2)
- 23 Thanksgiving Holiday
- 24 Thanksgiving Holiday--(Leftover's day)

- 27 Partial Ders. (9.2), Maxima & Minima (9.3)
- 29 Lagrange Multipliers (9.4)
- 30 Math Lab

- Dec. 1 Double Integrals (9.6)

- 9 The Chain Rule (4.3), Der. of Trig. Funct.(13.2)

- 16 Review for Exam

DEC. 1st COMPREHENSIVE FINAL EXAM

x (Monday) 3:00 p.m. - 6:00 p.m.

a Take in the Testing Center

m

Dec. 5-6 Exam IV (Chs. 7 & 9)

7 Review for Final Exam

8 Review for Final Exam

Math 119 Description and Major Objectives

The **Math 119** course gives students the basics of differential and integral calculus. Students who are planning to attend graduate school and need to have some calculus knowledge typically take this course. Computer Science majors can also take this course to fulfill the calculus requirement. The course focuses more on applications using calculus and less on theory. Business, science, medicine, and social science applications are emphasized.

Math 119 Course Objectives

Algebra Review

The first major focus for the course is to **review the function concept** and the properties of **various types of functions**.

- A. Students will learn and be able to determine the domain, range, and graphs for linear, polynomial, rational, radical, power, exponential and logarithmic functions.
- B. Students will be able to determine the average rate of change of a function over an interval.
- C. An algebra capstone learning experience is for the students to be able to determine an appropriate equation of a function that will accurately model real world data.

Differential Calculus

The next part of the course covers the concepts of **limits, instantaneous rate of change, and derivatives**.

- A. Students will be able to evaluate various types of limits and use limits to determine vertical and horizontal asymptotes.
- B. Students will learn a new type of rate of change called the instantaneous rate of change and will discover that it is equivalent to the slope of the tangent line at a specific point, the slope of the function at a specific point, and derivative.
- C. Students will be able to determine the derivative of a function using the definition as well by using the various rules for determining derivatives (constant rule, power rule, sum or difference rule, product rule, quotient rule, chain rule, rules for exponential, logarithmic and implicit functions).
- D. Students will learn the relationship of continuity and differentiability of a function and demonstrate their knowledge through working problems.

Differential Applications

After learning how to determine the derivative of a function, the next part of the course focuses on **applications of the derivatives**.

- A. Students will learn how the derivative is used in business applications including marginal analysis, relative and percentage errors, differentials, and rates of growth.
- B. Students will learn how the first and second derivatives explain the behavior of a function's graph such as intervals where the function is increasing or decreasing, where it has high or low points, and where the

graph is concave up or concave down.

- C. Students will learn how calculus can be used in optimization applications and will be able to determine maximum and/or minimum values).
- D. Students will learn how to solve applications involving the concept of related rates.

Integral Calculus

The next part of the course begins with learning how to **undo the process of differentiation** to recover functions when the rate of change function is given.

- A. Students will be able to determine the antiderivative of polynomial, power (including when the exponent is -1), and exponential functions.
- B. Students will learn the relationship between the area under a curve and the definite integral.
- C. Students will be able to use the Fundamental Theorem of Calculus in evaluating definite integrals and will learn how it ties differential and integral calculus together.
- D. Students will learn how to use the method of substitution to evaluate integrals.

Integral Applications

After the mechanics of antidifferentiation (or integration) have been covered, several applications of integration are considered. Emphasis is placed on working problems from business, science, medicine, and social science.

- A. Students will be able to determine the average value of a continuous function and interpret the results for application problems.
- B. Students will learn how to determine the area between two curves and will work application problems involving consumer surplus and producer surplus, total accumulation, continuous income streams, and annuities.

Calculus of Several Variables

Differential and Integral calculus of two independent variable will be briefly covered.

- A. Student will be able to write, evaluate and interpret functions with more than one independent variable.
- B. Students will learn how to determine and interpret level curves, contour maps, and topographical maps, by working applications.
- C. Student will learn how to determine the rate of change of functions with two independent variables using partial derivatives and will be able to work applications involving partial derivatives.
- D. Student will be able to determine second order partial derivatives and will be able to use them in working optimization problems (finding relative maxima or minima on a surface).

- E. Students will learn how to integrate (simple) functions with two independent variables (i.e. evaluate double integrals) and will be able to interpret the results.
- F. An optional (highly recommended) topic for the course is the method of Lagrange multipliers. The student will be apply Lagrange multipliers to solve extrema problems with more than two variables and having additional constraints.