
Math 13 Calculus with Elementary Functions 1

Fall 2006

Professor: Adam Lucas
Telephone: x4018

Office: Galileo 103 D
Office Hrs: M 12:30-1:30, W: 2:10-3:10
F: 12:30-1:30 or by appt.

Home phone: (415)-885-1680
Internet: blackboard.stmarys-ca.edu
(see Math 13 webpage)

email: alr3@stmarys-ca.edu

Prerequisites The successful completion of one year each of high school algebra 1,2, and geometry.

Course Credit and Schedule. One Saint Mary's College unit
Sec 1: MWF 9:10-10:10
Sec 2: MWF 10:20-11:20

Text: *Thomas' Calculus* by Weir, Hass & Giordano, 11th ed. (ISBN 0-321-18558-7) and McKeague, *Intermediate Algebra*, 7th ed. Brooks/Cole (ISBN 0534418252)

Course Description: How do structural engineers predict how much the Bay Bridge will sway during an earthquake? How does the Federal Reserve analyze stock market fluctuations to help determine when to cut interest rates? What model do biologists use to describe the rate of stem cell growth in human embryos? The answer to all of these questions involves mathematical objects called functions. The study of functions is where calculus begins! We will mostly look at functions which will be important to us in calculus namely, polynomial, logarithmic and exponential functions.

One of the great accomplishments in modern mathematics is to apply these functions to study real world situations. Calculus teaches you how to use functions to study velocities and accelerations of moving bodies, find the firing angle that gives a cannon its greatest range, or calculate the area of irregular regions in the plane. Calculus is a really fun subject because you will learn to use powerful ideas that took centuries to develop. It is also a really challenging subject because it requires solid algebra skills and has thought provoking concepts.

Homework:

Problems will be assigned at the end of each class. It is important for your success in the course that you attempt to do those problems before the following class meeting. The struggle to solve them prepares you for the following class.

You may discuss the homework by forming a group and studying with your peers. If you need help please come to my office or go to Sichel 105, the Academic Support and Achievement Program, and ask for a tutor. Act fast and do not fall behind.

A completed homework assignment should be folded lengthwise in half. On the outside front half, print your name, the assignment number, the due date of the assignment, and the time you spent doing the assignment. Please staple your homework.

Attendance:

Attendance is required and roll will be taken at the *beginning* of each hour. If you are not in your seat when roll is taken, you may be considered absent, so be on time. You are allowed to miss three classes without affecting your grade. After your grade is dropped one step (A- to B+, C+ to C, etc.). Thereafter, each two successive absences your grade is dropped one step further. If there is a *major* illness or incapacitation, speak to your instructor. SMC athletes are excused to attend team commitments but are responsible for notifying me ahead of time (see below).

Exams:

There will be three midterm examinations and a final exam. Suppose a student receives the following grades.

First Midterm	B
Second Midterm	C
Third Midterm	B-
Final Exam	C+, C+
Homework Grade	A-

Then the lowest of the Midterm/Final Exam grades above is dropped. If you miss a midterm exam that is the grade you drop. The final grade for the course is the average of the remaining five grades, in this example a B-. The Homework Grade cannot be dropped.

Honor code:

Students are expected to abide by the SMC honor code when taking exams and doing course work.

Exam Dates:**Midterm exams:**

Friday, September 22 classtime 1 hour exam
Wednesday, October 11 classtime 1 hour exam
Friday, November 10 classtime 1 hour exam

Final exam:

Sec 1 (9:10am class): Wednesday 9-11 Dec. 6
Sec 2 (10:20 am class) Monday 11:30-1:30 Dec. 4

SMC Athletes:

No later than September 10, I need to receive from each SM C athlete a statement indicating:

Your name,
The sport you play, and
The class dates that you will miss due to team commitments,
This statement must be written and signed by the athlete.

Schedule of Topics

- Week 1** Functions and relations, arrow diagrams, sets of ordered pairs, domain and range restrictions of a function, introduction to graphing.
Algebra review: real numbers, equations and inequalities in one variable, exponents
- Week 2** Vertical and horizontal line test, graphing functions like $y=x^5$ and $y=1/x$, square root function, piecewise functions, the inverse of a function.
Algebra review: exponents and polynomials, Foil, factoring
- Week 3** Decomposition of functions, translates of basic functions (for example $y=(x+3)^2+7$ is a translate of $y=x^2$), introduction to limits
Algebra review: factoring, rational expressions, complex fractions
- Week 4** Limits, review for test 1.
Algebra review: exponents and polynomials, rational expressions
- Week 5** Limits, continuity

- Algebra review: rational exponents and roots
- Week 6** Introduction to the derivative: interpretations and applications
- Algebra review: rational exponents and roots
- Week 7** The derivative of a function: interpretations.
- Algebra review: complex numbers, rational exponents and roots
- Week 8** Review for test 2
- Week 9** Interpretations of the derivative, the power rule, functions whose derivative don't exist
- Algebra review: rational exponents and roots
- Week 10** The derivative of a sum of functions, product rule, quotient rule
- Algebra review: quadratic functions
- Week 11** Introduction to logs
- Week 12** The derivative of \log , review for test 3
- Week 13** The chain rule, implicit differentiation
- Week 14** Higher derivatives, applications of calculus to physics, review for final