

Math 121 A: Calculus I  
Spring Term 2009  
Course Description

April 13, 2009

**Instructor:** John Schmitt

**Office:** Warner 311, **Tel:** Ext. 5952

**E-mail:** jschmitt@middlebury.edu

**Office Hours:** Monday 3-4 pm, Tuesday 10-11 am, Wednesday 3-4 pm, Friday 10-11 am, or by arrangement

**Meeting Times:**

**Section C**

MWF, 11:15 am - 12:05 pm Warner Hall 202

Tues., 11:00 am - 12:15 pm Warner Hall 208

**Textbook:** James Stewart, *Single Variable Calculus, 6th edition*, Thomson-Brooks/Cole, 2008.

**Goals of the course:**

- gain an understanding of fundamental notions in calculus, including limits and continuity
- gain the skills to perform computations involving differentiation and integration
- gain an appreciation for applications of calculus to biology, economics, engineering, physics, computer science and more
- gain a desire and foundation for further study within mathematics
- improve one's ability to write a logical and coherent mathematical proof

**Homework:** Homework will be assigned on a daily basis. The content of this course is best learned by *practicing problems*. I **encourage you to work together** and attend the

help sessions. However, the write-up of homework solutions *should be done on your own*. Homework will be collected three times a week - Monday, Wednesday, and Friday.

**Quizzes:** I reserve the right to give quizzes. If given, they will be short in length and cover recent homework problems. They will generally be announced beforehand.

**Calculus Help** is available at the *Drop In* tutoring sessions.

Session Times: Sunday, Tuesday, Thursday: 7-9 p.m.

Location: Mathematics Common Room, 3rd floor Warner.

Beginning: soon!

**Special Needs:** If you require special arrangements for class or during tests/exams please talk to me as soon as possible to make such arrangements.

**Eligibility:** If you have scored a 4 or 5 on the AB Calculus exam, you are **NOT** permitted to take this course, per college regulations. If you scored an A, B or C on the British 'A-level' exam, you are not permitted to take this course. If you scored a 5, 6 or 7 on the I.B. exam, you are not permitted to take this course. Please see me if you have questions.

**Grading Percentages:**

Homework/Quizzes	10
Three midterms	60
Final	30

**Assignment of Grades:**

The assignment of grades will follow the scheme below.

90 and above	A
80 - 89	B
70 - 79	C
60 -69	D
below 60	F

Plus and minus will be assigned at my discretion. The lowest two homework scores are dropped from consideration.

**Midterm Exams:** Tentative Schedule:

Tuesday, March 10

Tuesday, April 7

Tuesday, April 28

**Final Exam:** The final exam is scheduled for Saturday, May 16th from 2-5pm and will be administered at this time only, please make plans accordingly.

**Absences:** Please see me as far in advance as possible for absences that will occur on the day of an exam. Any such absences, or unforeseen ones, must be documented in writing by the appropriate person.

**Honor Code:** The Middlebury College Honor Code will be observed throughout this class and for all examinations. Exams, unless otherwise noted, will be given as “closed-notes, closed-book, no calculator.” Failure to comply with the homework policy (see above) will be considered a violation of the honor code. If you have a question about how the Honor Code applies to this class please ask.

**Course Webpage:** Problem sets, syllabi, practice exams and other relevant material will be posted on a course website, available by linking from my homepage:  
<http://community.middlebury.edu/~jschmitt/>.

**Basic Etiquette:** Please turn off all cell phones and other noise-making electronic devices. I anticipate you remaining seated in the room for the entire time period, though not without exception.

# Calculus I - Course Content

## 1. Limits

- Limit of a function
- Limit laws
- Precise definition
- Continuity

## 2. Derivatives

- Rates of change
- Derivative as a function
- Differentiation formulas, derivatives of trigonometric and composite functions
- Implicit differentiation
- Related rates

## 3. Applications of differentiation

- Finding maxima and minima
- The mean value theorem
- Curve sketching
- Optimization problems
- Newton's method
- Antiderivatives

## 4. Integrals

- The definite integral
- The fundamental theorem of calculus, parts I and II
- The substitution rule

## 5. Applications of integration

- Areas between curves
- Volumes (if time permits)
- Average value of a function

## 6. Exponential and logarithmic functions

Table 1: Below is a “fairly” accurate schedule for the topics we will cover, and Exam dates. These may change, if need be.

	Monday	Tuesday	Wednesday	Thurs.	Friday
February 9	Introduction	<b>2.1</b> The tangent problem	<b>2.2</b> Limit of a function		<b>2.3</b> Calculating limits
February 16	<b>2.4</b> Limit definition	<b>2.5</b> Continuity	<b>3.1</b> Rates of change		Winter Carnival
February 23	<b>3.2</b> Derivative as a function	<b>3.3</b> Differentiation formulas	<b>3.4</b> Derivatives of trig. functions		<b>3.5</b> Chain rule
March 2	<b>3.6</b> Implicit differentiation	<b>3.7</b> Rates of change	<b>3.8</b> Related rates		continued
March 9	Questions	EXAM	<b>3.9</b> Linear approximations and differentials		<b>4.1</b> Maxima and minima
March 16	<b>4.2</b> Mean value theorem	<b>4.3</b> Shape of a graph	<b>4.4</b> Limits at infinity		<b>4.5</b> Curve sketching
March 23	Spring	Break			
March 30	<b>4.7</b> Optimization problems	continued	<b>4.8</b> Newton’s method		<b>4.9</b> Antiderivatives
April 6	Questions	EXAM	<b>5.1</b> Areas and distances		Induction
April 13	Continued	<b>5.2</b> Definite integral	<b>5.3</b> Fundamental theorem of Calculus		continued (and Research Symposium)
April 20	<b>5.4</b> Indefinite integrals	<b>5.5</b> Substitution rule	continued		<b>6.1</b> Areas between curves
April 27	Questions	EXAM	<b>6.2</b> Volumes		Shells versus cylinders
May 4	<b>6.5</b> Average value	The natural logarithm	The exponential function		Questions