

Math 149 –Calculus/Precalculus II

Course Description from Bulletin: Applications of derivatives: related rates, maxima and minima, monotonicity, concavity, graphing, and optimization. Antiderivatives, first-order differential equations. Definite integrals and applications. Implicit and inverse functions, and inverse trigonometric functions. (4-1-5) (C).

Enrollment: Elective for AM and other majors by placement exam with consent of the AM Director of Undergraduate Studies.

Textbook(s): James Stewart, *Single Variable Calculus*, 6th Ed., Thomson, Brooks/Cole (2008), ISBN 0-495-01161-4.
David Cohen, with Theodore B. Lee, David Sklar, *Precalculus, A Problems-Oriented Approach*, 6th Ed., Thomson, Brooks/Cole (2004), ISBN 0-534-40212-7.

Other required material: Mathematica access

Prerequisites: MATH 148 Calculus/Precalculus I

Objectives:

1. Students will be able to use differentiation for finding extrema, related rates, and solving optimization problems.
2. Students will be able to differentiate implicit, inverse, and inverse trigonometric functions.
3. Students will be able to find antiderivatives and solve simple first-order differential equations.
4. Students will be able to compute definite integrals of simple functions by using Riemann sums and by using the Fundamental Theorem of Calculus.
5. Students will be able to use integration in simple applications to geometry, science, and engineering.
6. Students will develop their ability to use Mathematica for exploring mathematical concepts by completing laboratory assignments.
7. Students will develop their ability to communicate mathematical ideas by completing a writing project and presentation assignments.

Lecture schedule: Three 67 minute lectures per week

Laboratory/Recitation schedule: One 75 minute period per week, alternating laboratory with recitation.

Course Outline:

	Hours
1. Introduction and Review	3
a. Uses of dy/dx notation	
2. Applications of Differentiation	13
a. Related rates	
b. Maxima and minima, mean value theorem, first derivative test	
c. Concavity, flexpoints, graphing	
d. Optimization	

3. Differentiation Techniques	10
a. Implicit differentiation	
b. Inverse functions	
c. Inverse trigonometric functions and their derivatives	
4. Additional Applications of Differentiation	10
a. Differentials	
b. Newton's method	
c. Antiderivatives and differential equations	
5. Integration	10
a. The definite integral	
b. Fundamental theorem of calculus, areas	
c. Integration by substitution, numerical integration	
6. Applications of Integration	7
a. Geometric applications of integration	
b. Physical applications of integration	
7. Exponential and Logarithmic Functions	3

Total: 56

Assessment:	Attendance	0-5%
	Homework	0-5%
	Mathematica Laboratory	0-5%
	Recitation	0-5%
	Writing Project	=5% Bonus
	Quizzes	10-15%
	Midterm Examinations	45-50%
	Final Exam	25-30%

Syllabus prepared by: Patrick Dale McCray and Susan Sitton

Date: Jan. 9, 2006 (Last updated Dec.08, 2010)