CAL POLY

September 2008

Mathematics 142 Calculus II

1. Catalog Description

MATH 141, 142, 143 Calculus I, II, III (4) (4) (4) GE B1
(Also listed as HNRS 141, 142, 143)

Limits, continuity, differentiation, integration. Techniques of integration, applications to physics, transcendental functions. Infinite sequences and series, vector algebra, curves. 4 lectures. **MATH 141** prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 118 and MATH 119 or equivalent. **MATH 142** prerequisite: MATH 141 with a grade of C- or better or consent of instructor. **MATH 143** prerequisite: MATH 142.

2. Required Background or Experience

Math 141 or equivalent.

3. Learning Objectives

The student should:
a. Be able to differentiate and integrate elementary transcendental functions.
b. Understand some of the applications of integration, including areas, volumes, work, arc length, lateral surface area, and center of mass.
c. Know how to integrate combinations of elementary functions with accuracy and confidence.

4. Text and References

James Stewart, Calculus, 5th edition, Thomson Brooks/Cole, 2003.

5. Minimum Student Materials

Paper, pencils and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

	Content	No. of Lectures
CHAPTER 5 – **INTEGRALS**		1
5.5	The Substitution Rule	
CHAPTER 6 – **APPLICATIONS OF INTEGRATION**		5
6.1	Areas between Curves	
6.2	Volumes	
6.3	Volumes by Cylindrical Shells	
6.4	Work	
* 6.5	Average Value of a Function	

CHAPTER 7 –	**INVERSE FUNCTIONS: EXPONENTIAL, LOGARITHMIC AND INVERSE TRIGONOMETRIC FUNCTIONS**		9
	7.1	Inverse Functions	
	7.2	Exponential Functions and Their Derivatives	
	7.3	Logarithmic Functions	
	7.4	Derivatives of Logarithmic Functions	
	7.5	Inverse Trigonometric Functions	
*	7.6	Hyperbolic Functions	
	7.7	Indeterminate Forms and L'Hôpital's Rule	
CHAPTER 8 –	**TECHNIQUES OF INTEGRATION**		11
	8.1	Integration by Parts	
	8.2	Trigonometric Integrals	
	8.3	Trigonometric Substitution	
	8.4	Integration of Rational Functions by Partial Fractions	
	8.5	Strategy for Integration	
*	8.6	Using Tables of Integrals and Computer Algebra Systems	
	8.7	Approximate Integration	
	8.8	Improper Integrals	
CHAPTER 9 –	**FURTHER APPLICATIONS OF INTEGRATION**		6
	9.1	Arc Length	
	9.2	Area of a Surface of Revolution	
	9.3	Applications to Physics and Engineering	
	9.4	Applications to Economics and Biology	
CHAPTER 10 –	**DIFFERENTIAL EQUATIONS**		2
	10.1	Modeling with Differential Equations	
	10.4	Exponential Growth and Decay	
		Total	34

*Instructors should monitor their progress in relation to the suggested number of lectures in each chapter and attempt to cover the entire syllabus. If an instructor anticipates being unable to do so, topics identified with an asterisk may be covered more lightly. It is essential that topics without an asterisk be covered carefully in order to prepare students for subsequent courses.

Note that in section 10.4, the differential equation $dy/dt = ky$ is solved formally by separating variables, a technique learned in section 10.3, which we do not cover. However, the solution is so natural, and known already from section 7.2, that instructors should encounter little if any confusion.

Method

Largely lecture with chalkboard illustration of the discussion along with supervised work and individual conferences.

8. Methods of Assessment

The primary methods of assessment are, in decreasing order of importance: essay examinations, quizzes and homework. Typically, there will be two or three hour-long examinations during the quarter, and a comprehensive final examination. Students are required to show their work, and are graded not only on the correctness of their answers, but also on their understanding of the concepts and techniques. Quizzes are typically given once or twice a week to provide a spot check of student learning. Homework is required daily.