



September 2011

## MATH 142 Calculus II

### 1. Catalog Description

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

**GE B1**

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:

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

### 4. Text and References

James Stewart, Calculus, 6th edition, Thomson Brooks/Cole, 2008.

Note: We use a “custom edition” of the Stewart text. It differs from the standard edition only in the inclusion of supplementary homework problems at the end of each chapter. Solutions to the supplementary problems are not included in the standard solutions manuals.

### 5. Minimum Student Materials

Paper, pencils and notebook.

### 6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

### 7. Content and Method

The sections listed below are considered to be the core of the course. It is estimated that about 30 lectures will be needed to cover them. Quarters vary from 38 to 41 lectures. Possible uses for any remaining lectures include:

- Covering more sections

2. Covering some sections in more depth
3. Computer labs
4. Group projects/class presentations

It is also possible to free up more class time by assigning some sections as reading assignments.

Comments accompanying some of the sections are intended to give some guidance to new instructors. As well as to suggest possible ways in which class time might be saved without losing important content.

<u>Content</u>	<u>No. of Lectures</u>
CHAPTER 5 – <b>INTEGRALS</b>	1
5.5 The Substitution Rule	
CHAPTER 6 – <b>APPLICATIONS OF INTEGRATION</b>	5
6.1 Areas between Curves	
6.2 Volumes	
6.3 Volumes by Cylindrical Shells	
6.4 Work (cover at least one problem type; pumping water is recommended)	
CHAPTER 7 – <b>INVERSE FUNCTIONS: EXPONENTIAL, LOGARITHMIC AND INVERSE TRIGONOMETRIC FUNCTIONS</b>	8
7.1 Inverse Functions	
7.2 Exponential Functions and Their Derivatives	
7.3 Logarithmic Functions	
7.4 Derivatives of Logarithmic Functions	
7.5 Exponential Growth and Decay (may be postponed until after 10.3)	
7.6 Inverse Trigonometric Functions (emphasize inverse sine and tangent functions)	
7.8 Indeterminate Forms and L'Hôpital's Rule	
CHAPTER 8 – <b>TECHNIQUES OF INTEGRATION</b>	9
8.1 Integration by Parts	
8.2 Trigonometric Integrals	
8.3 Trigonometric Substitution (cover at least two substitutions)	
8.4 Integration of Rational Functions by Partial Fractions	
8.5 Strategy for Integration	
8.7 Approximate Integration (cover at least one of the approximation methods; deemphasize formulas)	
8.8 Improper Integrals (emphasize unbounded domains).	
CHAPTER 9 – <b>FURTHER APPLICATIONS OF INTEGRATION</b>	5
9.1 Arc Length	
9.2 Area of a Surface of Revolution (deemphasize formulas)	
9.3 Applications to Physics and Engineering (cover at least one application; center of mass is recommended)	
CHAPTER 10 – <b>DIFFERENTIAL EQUATIONS</b>	2
10.3 Separable Equations (cover 7.5 now if not done previously)	
10.4 Models for Population Growth	
Total	30

### 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 examinations, quizzes and homework. A comprehensive final examination is required. Students are expected to show their work, and are graded on the correctness of their answers as well as their understanding of the concepts and techniques.