

MATH 182 Calculus for Architecture and Construction Management

1. Catalog Description

MATH 182 Calculus for Architecture and Construction Management (4) GE B1

Integral calculus with applications to architecture and construction management. The algebra of vectors. Polar, cylindrical, and spherical coordinate systems. Not open to students with credit in MATH 142. 4 lectures. Prerequisite: MATH 141 or equivalent.

2. Required Background or Experience

Math 141 or equivalent.

3. Expected Outcomes

The student should:

- a. Understand the method of substitution as a tool in evaluating integrals.
- b. Understand the calculus of exponential and logarithmic functions and some of their applications.
- c. Understand inverse trigonometric functions, and some of their applications.
- d. Become familiar with some applications of integral calculus specific to architecture and construction management.
- e. Become familiar with elementary differential equations and their use in modeling physical phenomena.
- f. Understand the algebra of vectors and some appropriate applications.
- g. Become familiar with polar, cylindrical, and spherical coordinate systems.

4. Text and References

Stewart, James, Calculus, 5th ed., Brooks Cole Publishing, Inc., 2003.

5. Minimum Student Materials

Paper, pencils and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Expanded Description of Content and Method

<u>Content</u>	<u>No. of Lectures</u>
CHAPTER 5 - INTEGRALS	2
5.5 The Substitution Rule	
CHAPTER 6 - APPLICATIONS OF INTEGRATION	7
6.1 Areas between Curves	
6.2 Volumes	
6.3 Volumes by Cylindrical Shells	
6.4 Work (include discussion of dimensional analysis and unit conversions)	
6.5 Average Value of a Function	

CHAPTER 7 - INVERSE FUNCTIONS: EXPONENTIAL, LOGARITHMIC AND INVERSE TRIGONOMETRIC FUNCTIONS	8
7.1 Inverse Functions	
7.2 Exponential Functions and Their Derivatives	
7.3 Logarithmic Functions	
7.4 Derivatives of Logarithmic Functions	
7.5 Inverse Trig Functions (algebraic properties only)	
CHAPTER 8 - TECHNIQUES OF INTEGRATION	0
8.6 Integration Using Tables and Computer Algebra Systems (<i>optional</i>)	
CHAPTER 9 - FURTHER APPLICATIONS OF INTEGRATION	7
9.1 Arc Length	
9.2 Area of a Surface of Revolution	
9.3 Applications to Physics and Engineering (Hydrostatic pressure and force, moments and centers of mass, additivity of moments, Theorem of Pappus)	
*9.4 Applications to Economics and Biology	
CHAPTER 10 – DIFFERENTIAL EQUATIONS	5
10.1 Modeling with Differential Equations	
10.3 Separable Equations	
10.4 Exponential Growth and Decay	
CHAPTER 11 – (<i>abbreviated</i>) and CHAPTER 13 – VECTORS AND THE GEOMETRY OF SPACE	5
13.1 Three Dimensional Coordinate Systems	
13.2 Vectors	
11.3 Polar Coordinates	
13.7 Cylindrical and Spherical Coordinates	
	34
Total	

* 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.

8. Method

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

9. 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. Since this class satisfies a General Education requirement, at least 10% of the course grade must be based on student writing using correct mathematical notation.