

MATH 182 Calculus for Architecture and Construction Management

1. Catalog Description

MATH 182 Calculus for Architecture and Construction Management

4 units

GE Area B1

Prerequisite: MATH 141.

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. Fulfills GE B1; for students admitted Fall 2016 or later, a grade of C- or better in one GE B1 course is required to fulfill GE Area B.

2. Required Background or Experience

Math 141 or equivalent.

3. Learning Objectives

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

- Weir, Maurice, et al., Thomas' Calculus, Addison-Wesley.

5. Minimum Student Materials

Paper, pencils and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

<u>Content</u>	<u>Lectures</u>
CHAPTER 5 – INTEGRATION	3
5.5 Indefinite Integrals and the Substitution Method (emphasize substitution)	
5.6 Substitution and Area Between Curves	
CHAPTER 6 – APPLICATIONS OF DEFINITE INTEGRALS	11
6.1 Volumes Using Cross-Sections	
6.2 Volumes Using Cylindrical Shells	
6.3 Arc Length	
6.4 Areas of Surfaces of Revolution	
6.5 Work and Fluid Forces	
6.6 Moments and Centers of Mass	
CHAPTER 7 – TRANSCENDENTAL FUNCTIONS	7
7.1 Inverse Functions and Their Derivatives	
7.2 Natural Logarithms	
7.3 Exponential Functions	
7.6 Inverse Trigonometric Functions (algebraic properties only)	
CHAPTER 9 – FIRST-ORDER DIFFERENTIAL EQUATIONS	4
9.1 Solutions, Slope Fields, and Euler’s Method (skip Euler’s Method)	
7.4 Exponential Change and Separable Differential Equations	
9.4 Graphical Solutions of Autonomous Equations	
CHAPTER 11 – PARAMETRIC EQUATIONS AND POLAR COORDINATES	2
11.3 Polar Coordinates	
11.4 Graphing in Polar Coordinates	
CHAPTER 12 – VECTORS AND THE GEOMETRY OF SPACE	2
12.1 Three-Dimensional Coordinate Systems	
12.2 Vectors	
CHAPTER 15 – MULTIPLE INTEGRALS	1
15.7 Triple Integrals in Cylindrical and Spherical Coordinates (only cover the definitions of the two coordinate systems)	

Total	30

Method

The pacing of Math 182 is more relaxed than in Math 142, allowing for an increased emphasis on applications of integral calculus. Instructors should expect to spend about five days combined on sections 6.5 and 6.6. The selected topics from section 7.6 and chapters 11,12, and 15 will not involve calculus.

8. Methods of Assessment

The primary methods of assessment are: essay examinations, quizzes and homework. Typically, there will be one or more hour-long examinations during the quarter, and a required 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.