MATH 182 Calculus for Architecture and Construction Management

1. <u>Catalog Description</u>

    MATH 182 Calculus for Architecture and Construction Management　　　　　**4 units**
    GE Area B1

    Prerequisite: <u>MATH 141</u>.

    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 <u>MATH 142</u>. 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. <u>Required Background or Experience</u>

    Math 141 or equivalent.

3. <u>Learning Objectives</u>

    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. <u>Text and References</u>

    Stewart, James, <u>Calculus</u>, Eighth Edition, Cengage Learning.

5. <u>Minimum Student Materials</u>

    Paper, pencils and notebook.

6. <u>Minimum University Facilities</u>

    Classroom with ample chalkboard space for class use.

7. <u>Content and Method</u>

<u>Content</u>   <u>Lectures</u>

CHAPTER 4 – **INTEGRALS**   1
    4.5   The Substitution Rule

CHAPTER 5 –**APPLICATIONS OF INTEGRATION**   5
    5.1   Areas Between Curves
    5.2   Volumes
    5.3   Volumes By Cylindrical Shells
    5.4   Work

CHAPTER 6 –**INVERSE FUNCTIONS**   7
    6.1   Inverse Functions
    6.2   Exponential Functions and Their Derivatives
    6.3   Logarithmic Functions
    6.4   Derivatives of Logarithmic Functions
    6.5   Exponential Growth and Decay
    6.6   Inverse Trigonometric Functions (algebraic properties only)

CHAPTER 8 –**FURTHER APPLICATIONS OF INTEGRATION**   7
    8.1   Arc Length
    8.2   Area of a Surface of Revolution
    8.3   Applications to Physics and Engineering

CHAPTER 9– **DIFFERENTIAL EQUATIONS**   4
    9.1   Modeling with Differential Equations
    9.2   Direction Fields and Euler's Method (skip Euler's Method)
    9.3   Separable Equations

CHAPTER 10 –**PARAMETRIC EQUATIONS AND POLAR COORDINATES**   2
    10.3   Polar Coordinates

CHAPTER 12 – **VECTORS AND THE GEOMETRY OF SPACE**   2
    12.1   Three-Dimensional Coordinate Systems
    12.2   Vectors

CHAPTER 15 –**MULTIPLE INTEGRALS**   2
    15.7   Triple Integrals in Cylindrical Coordinates
    15.8   Triple Integrals in Spherical Coordinates
                 (only cover the definitions of the two coordinate systems)
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                                         Total   30

<u>Method</u>

The pacing of Math 182 is more relaxed than in Math 142, allowing for an increased emphasis on applications of integral calculus. The selected topics from section 6.6 and chapters 10, 12, and 15 will not involve calculus.

8. <u>Methods of Assessment</u>

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.