Mathematics 162 Calculus for the Life Sciences II

1. Catalog Description

MATH 162 Calculus for the Life Sciences II **4 units**
GE Area B1

Prerequisite: MATH 161.

Review of exponential, logarithmic, and trigonometric functions. Differential and integral calculus with applications to the biological sciences. Introduction to differential equations and mathematical modeling. Examples, exercises and applications to emphasize problems in life sciences. 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 161 or equivalent.

3. Learning Objectives

Upon completion of Math 162, the student should:

a. Understand antiderivatives and the indefinite integral.
b. Understand the Fundamental Theorem of Calculus.
c. Be able to apply the integral in the analysis of selected biological phenomena.
d. Understand the integration techniques of substitution, integration by parts, and partial fractions.
e. Have a basic understanding of matrices and systems of linear equations.
f. Understand how elementary differential equations can be used to model certain biological systems.
g. Understand the elementary concepts of multivariable calculus: the partial derivative and optimization.

4. Text and References

- Stewart, James and Day, Troy, Biocalculus: Calculus for the Life Sciences, Cengage Learning.

5. Minimum Student Materials

Paper, pencils, calculator and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

Content	No. of Lectures
4. Applications of Derivatives 4.6 Antiderivatives	1
5. Integrals 5.1 Areas, Distances, and Pathogenesis 5.2 The Definite Integral 5.3 The Fundamental Theorem of Calculus 5.4 The Substitution Rule 5.5 Integration by Parts 5.6 Partial Fractions	9
6. Applications of Integrals 6.1 Areas Between Curves 6.3 Further Applications to Biology	3
7. Differential Equations 7.1 Modeling with Differential Equations 7.2 Phase Plots, Equilibria, and Stability 7.3 Direction Fields and Euler's Method 7.4 Separable Equations	8
8. Vectors and Matrix Models 8.1 Coordinate Systems 8.4 Matrix Algebra 8.6 The Inverse and Determinant of a Matrix	4
9. Multivariable Calculus 9.1 Functions of Several Variables 9.2 Partial Derivatives 9.6 Maximum and Minimum Values	5
Total	30

Method

Largely lecture with blackboard illustration of the discussion along with supervised work and individual conferences. Most examples, exercises and applications will be taken from the life sciences.

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.