

OFFICIAL SYLLABUS

Math 145: Calculus for the Life Sciences

(Draft – Fall 2014: Committee: U. Ledzewicz, Y. May, J. Palden, G. Pelekanos)

Catalog Description: Fundamental concepts of calculus with applications focused on the life sciences: limits, continuity, derivatives, integrals, fundamental theorem of calculus, partial derivatives, differential equations, and applications. **Course not a prerequisite for Math 152.**

Prerequisite: Math 125 with a C or higher, ACT Math 28+, or placement test score sufficient to enroll in Math 150

Textbook: Biocalculus: Calculus for the Life Sciences by Stewart and Day, Cengage Learning, ISBN-13: 978-1-133-10963-1, First Edition

Chapter 2: Limits

- 2.2: Limits of Functions at Infinity
- 2.3: Limits of Functions at Finite Numbers
- 2.4: Limits: Algebraic Methods
- 2.5: Continuity

Chapter 3: Derivatives

- 3.1: Derivatives and Rates of Change
- 3.2: The Derivatives as a Function
- 3.3: Basic Differentiation Formulas
- 3.4: The Product and Quotient Rules
- 3.5: The Chain Rule
- 3.6: Exponential Growth and Decay
- 3.7: Derivatives of Logarithmic Functions
- 3.8: Tangent Line Approximations

Chapter 4: Applications of Derivatives

- 4.1: Maximum and Minimum Values
- 4.2: Increasing and Decreasing Functions, Concavity, Graphing with Technology
- 4.3: L'Hospital's Rule: Indeterminate Quotients
- 4.4: Optimization Problems
- 4.6: Antiderivatives

Chapter 5: Integrals

- 5.1: Areas and Distances
- 5.2: The Definite Integral - Midpoint Rule
- 5.3: The Fundamental Theorem of Calculus
- 5.4: The Substitution Rule
- 5.8: Improper Integrals

Chapter 7: Differential Equations

- 7.1: Modeling with Differential Equations
- 7.2: Phase Plots, Equilibria, and Stability
- 7.3: Direction Fields
- 7.4: Separable Equations

Chapter 9: Multivariable Calculus

- 9.1: Functions of Several Variables
- 9.2: Partial Derivatives

Learning Objectives:

At the conclusion of this course students should:

- be able to compute derivatives and integrals of moderate complexity involving polynomials, exponentials, and logarithms
- be able to compute basic derivatives and integrals involving trigonometric functions
- have an understanding of the meaning of derivatives and integrals and be able to identify when their use is appropriate to an application
- be able to graph a polynomial, logarithm, or exponential function (or combination of these) using the first and second derivatives to obtain an accurate sketch
- be able to use the derivative to solve optimization and related rates problems of moderate complexity
- understand the role of differentials in science
- understand what is meant by a function of several variables, be able to compute basic partial derivatives, and understand the meaning of a partial derivative
- understand what is meant by a differential equation and be able to solve first order separable linear differential equations