OFFICIAL SYLLABUS
Math 145: Calculus for the Life Sciences

(Draft – Fall 2014: Committee: U. Ledzewicz, Y. May, J. Pailden, 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


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