

# Calculus and Differential Equations for Biology II: Outline

## Integral Calculus

Antiderivative and Areas Under Curves

Definite Integrals

Properties of Definite Integrals

\*Numerical Integration

## Integration Techniques

Substitution

Parts

*Partial Fractions*

Definite Integrals

\* Advanced Numerical Techniques

Improper Integrals

## Linear Algebra (review)

(*Matrix, Matrices*)

\**Inverses of Matrices*

(*Determinants*)

(*Eigenvalues*)

## Differential Equations

Separation of Variables

*Matrices and Differential Equations*

*Two and Three Compartment Problems*

### \*Numerical Methods

*Euler's method*

*Numerical solutions for circular reactions*

*Numerical solutions of higher order equations*

Etc.

*Michaelis-Menten Processes*

*Control systems*

*Tracer experiments- Inflow and outflow through Cell Membranes*

## Functions of Several Variables

Partial Derivatives

Maxima And Minima of Functions of Several Variables

Lagrange Multipliers and Constrained Optimization

Total Differentials and Their Applications

*Directional derivatives*

*Gradients*

*Parametric Equations of Curves*

*Line Integrals*

*Exact Differentials*

*Line Integrals and Exact Differentials*

\*Method of Least Squares

Double Integrals

## Taylor Polynomials and Infinite Series

Taylor Polynomials

Infinite Series

Taylor Series

*Series Solutions to Differential Equations*

## Probability

Discrete random variables (12.1)

*Markov Chains*

Continuous Random Variables

Expected Value and Variance

Exponential and Normal Random Variables

Poisson and Geometric Random Variables