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## **Fall 2005**

MTH U151  
Mathematics for the Biological Sciences  
1st Semester  
Outline

### **Differential Calculus**

Infinity and Infinitesimals  
The derivative  
The Rules of Differentiation  
Second Derivatives  
Curve Plotting  
The Function That is Its Own Derivative  
Exponentials and Logarithms

### **Pharmacokinetics**

How to use semilog graph paper  
Zero-order and first-order processes  
Processes tending toward equilibrium  
\*Bi-exponential processes  
\*"Peeling" Data  
Biological Half-life

### **Differential Equations**

First steps  
Homogeneous Linear Equations with Constant Coefficients  
First Order Linear Non-homogeneous Differential Equations with  
Constant Coefficients  
Non-homogeneous Linear Equations with Constant Coefficients I  
(particular solutions)  
Non-homogeneous Linear Equations with Constant Coefficients II  
(general solution)  
\*Deeper into non-homogeneous equations  
\*Systems of differential equations

### **\*Compartmental Problems**

Non-zero initial concentration  
Two compartment series dilution  
Diffusion between compartments

### **\*Tracer experiments**

Quantification of radioactivity  
Inflow and outflow through cell membranes

### **Trigonometric Functions**

Radian Measure  
Sine and Cosine  
Calculus of trig functions

### **More Differential Equations**

Complex Numbers  
Complex Roots of Characteristic Polynomials  
Nonhomogeneous Diff. Eq with Trigonometric Right Hand Side

*\*optional - if time permits*