

COURSE SYLLABUS

Course: Calculus for Management and Social Sciences
Number: Math 134
Units: 4 Credits

Course Description: Functions, graphs, analytic geometry of lines and circles, limits, continuity, derivatives, differential calculus of algebraic, exponential, and logarithmic functions; applications to rate problems, maxima and minima and curve sketching, area, integral as a function, accumulation, integration techniques.

Prerequisites: Precalculus Mathematics. Topics in algebra.

Detailed Syllabus:

0. Getting Started

1. Email and Chat
2. Learning About the Course
3. Required Hardware
 - i. Relatively new computer (Windows XP or Mac OSX 10.3 or higher)
 - ii. USB scanner
 - iii. Adjustable Webcam
 - iv. High-speed internet connection
4. Software
 - i. LiveMath Maker
 - ii. QuickTime/iTunes

1. The Big Picture

1. Solving (easy) equations in 1 variable.
2. What if you can't solve for x?
3. Finding solutions numerically
4. Finding solutions graphically
5. Solving equations of more than 1 variable

2. Functions

1. Function notation.
2. Data sets
3. Graphing functions
4. Data sets and smooth curves
5. Domain and Range
6. Algebraic combinations of functions

3. Linear Functions

1. Algebraic definition
2. Slope
3. Graphing linear functions by hand
4. Properties of linear functions
5. Linear data sets

4. Quadratic Functions

1. Algebraic definition
2. Graphing and Properties of Quadratic Functions
3. Solving quadratic equations algebraically: Factoring
4. Solving quadratic equations algebraically: Quadratic formula
5. Solving quadratic equations numerically and graphically
6. Complex Numbers
7. Quadratic data sets

5. Power and Polynomial Functions

1. Algebraic definition
2. Graphing and Properties of Polynomial Functions
3. Solving polynomial equations algebraically: factoring
4. Solving polynomial equations numerically and graphically
5. Fundamental Theorem of Algebra
6. Radicals and fractional exponents

6. Rational Polynomial Functions

1. Algebraic definition
2. Graphing and Properties of Rational Polynomial Functions
3. Solving rational polynomial equations algebraically: factoring
4. Solving rational polynomial equations numerically and graphically

7. Exponential Functions

1. Algebraic definition
2. Graphing and Properties of Exponential Functions
3. Solving exponential equations numerically and graphically
4. Exponential Growth and Applications
5. Data sets and exponential functions.

8. Logarithmic Functions

1. Inverse Functions
2. Algebraic Definition
3. Graphing and Properties of Logarithmic Functions
4. Solving exponential and logarithmic equations algebraically
5. Solving logarithmic equations numerically and graphically
6. Logarithmic Growth and Applications
7. Data sets and logarithmic functions.

9. Growth: Preparing for the Derivative

1. Growth of Linear Functions
2. Growth of Power Functions
3. Growth of Exponential Functions

4. Dominance of Growth of Functions
5. Percentage Growth of Functions
6. Global Scale: Infinite Limits
7. Data Functions and Interpolation
8. Approximation of Functions by Linear Functions

10. Continuity

1. Limits
2. Continuous Functions
3. Jump Discontinuities
4. Piecewise Functions and Continuity
5. Limit Rules

11. Exponential Functions and Natural Logarithms

1. e
2. Natural Logarithm
3. Growth Analysis
4. Applications: Carbon Dating
5. Percentage Growth and Steady Growth of Exponential Functions
6. Data Functions and Logarithmic Analysis
7. Inverse Functions
8. Applications: Compound Interest and Finance
9. Applications: World Population

12. The Derivative

1. Instantaneous Growth Rates
2. Definition of the Derivative
3. Computing the Derivative Graphically
4. Computing the Derivative Algebraically
5. Computing the Derivative Numerically
6. Average Growth Rate vs. Instantaneous Growth Rate
7. Applications of the Derivative: Spread of Disease
8. Finding Maxima and Minima of Functions
9. Relating a Function and Its Derivative

13. Computing Derivatives

1. Sum, Difference, Product, Quotient Rule
2. Chain Rule
3. Logarithmic Differentiation
4. Instantaneous Percentage Growth
5. Growth Dominance
6. Applications: Linear Dimensions

14. Using Derivatives

1. Finding Maxima and Minima
2. Finding Good Representative Plots
3. Applications: Maximizing Volume
4. The Second Derivative
5. Applications: The Space Shuttle Challenger

15. Integration

1. Measuring Area Under a Curve
2. Definition of the Integral
3. Properties of Integrals, Symmetry
4. Integrals of Data Functions
5. Numerical Methods: Rectangles, Trapezoids
6. Undefined Integrals
7. Numerical Calculation of Integrals

16. Fundamental Theorem of Calculus

1. Derivative of an Integral
2. Integral of a Derivative
3. Fundamental Formula
4. Distance, Velocity, and Acceleration
5. Improper Integrals
6. More Properties of Integrals
7. Applications: Measure Accumulation Totals
8. Indefinite Integrals and Antiderivatives

17. Computing Integrals

1. Algebraic Antiderivatives
2. u-substitution