

CALCULUS I

TEXT

Varies with instructor

GOAL

Students should learn the concepts of limit, derivative, and integral graphically, numerically, algebraically and verbally and should be able to apply these concepts in applications.

CORE TOPICS (must be covered in each section of MAT 126)

1. The concept of limits
2. Computation of limits
3. Continuity and the intermediate value theorem
4. Limits involving infinity, asymptotes
5. Derivative, tangent lines, velocity, acceleration. Derivative as a rate of change
6. Derivatives of elementary functions
7. Product and quotient rule
8. Chain rule
9. Implicit differentiation, derivatives of inverse trigonometric functions
10. The mean value theorem
11. Linear approximations and differential
12. Indeterminate forms and L'Hopital's rule
13. Maximum and minimum values (absolute and local extrema, the extreme value theorem, finding extrema on a closed interval)
14. Increasing and decreasing functions, first derivative test for max/min
15. Concavity, second derivative test for max/min
16. Curve sketching
17. Optimization
18. Related rates and parametric equations
19. Antiderivatives and indefinite integrals, including integrals involving inverse trigonometric functions. Finding position from velocity, velocity from acceleration
20. Definite integral
21. Applications, including the area under a curve, change in position, mass of a rod with variable density, and average value
22. The fundamental theorem of calculus
23. Substitution in indefinite and definite integrals

SUPPLEMENTARY TOPICS (included at instructor's discretion)

1. Lines and slopes
2. Functions: domain, range, even and odd functions, one-to-one functions, inverse functions
3. Basic elementary functions: power, exponential, logarithmic, trigonometric and inverse trigonometric functions
4. Transformation of functions
5. Newton's method
6. Rates of change in applications
7. Integration tables and computer algebra systems
8. Hyperbolic functions