

SYLLABUS
MATH 12002 – Analytic Geometry & Calculus I
(5 Credit Hours)

Catalog Information:

Concepts of limit, continuity, and derivative, and the indefinite and definite integral for functions of one real variable. Maximization, related rates, fundamental theorem of calculus.

This course may be used to satisfy the LERs. No credit for MATH 12011 or 12012. Students who have not taken a previous mathematics course at Kent State must see an academic advisor in the Student Advising Center for placement.

Prerequisite: A grade of C (2.0) or better in MATH 11022 and in one of 11010 or 11011; or a grade of C (2.0) or better in MATH 12001.

Text: *Essential Calculus*, by James Stewart (KSU custom edition)

Chapter 1: Functions and Limits (6 – 7 days)

§1.3 Limits, one-sided limits, definitions

§1.4 Calculating limits

- limit laws
- trigonometric limits needed for derivatives

§1.5 Continuity

§1.6 Infinite limits, limits at infinity, asymptotes

Notes:

- Students should review §1.1 and §1.2 on their own.
- §1.6 Limits Involving Infinity can be postponed until needed in Chapter 3.

Chapter 2: Derivatives (16 days)

§2.1 Derivatives, rates of change

§2.2 Derivative as a function, including higher derivatives

§2.3 Basic differentiation formulas

- derivative of a constant, power rule
- derivative of sine and cosine
- constant multiple, sum, and difference formulas
- application to rates of change

§2.4 Product and quotient rule

- derivatives of other trigonometric functions

§2.5 Chain rule

§2.6 Implicit differentiation

§2.7 Related rates

§2.8 Linear approximations and differentials

(MATH 12002 Syllabus, continued)

Chapter 3: Applications of Differentiation (15 days)

- §3.1 Maximum and minimum values
- §3.2 Mean Value Theorem
- §3.3 Derivatives and shapes of graphs
 - increasing/decreasing
 - concavity
- §3.4 Curve sketching
- §3.5 Optimization
- §3.6 Newton's method
- §3.7 Antiderivatives

Notes:

- Horizontal and vertical asymptotes are covered in §1.6.
- §3.6 is optional.

Chapter 4: Integrals (13 days)

- §4.1 Areas and distances
- §4.2 Definite integral, definition
- §4.3 Evaluating definite integrals
 - the "evaluation theorem"
 - indefinite integrals
 - net change theorem
- §4.4 Fundamental Theorem of Calculus
 - average value of a function
- §4.5 Substitution rule
- §7.1 Areas between curves

Notes:

- The remainder of Chapter 7 is included in MATH 12003.
- It may be useful to cover Appendix C, Sigma Notation, briefly before §4.1.

Chapter 5: Inverse Functions (Exponential, Logarithmic, and Inverse Trig) (15 days)

- §5.1 Inverse functions
- §5.2 Natural logarithmic function
- §5.3 Natural exponential function
- §5.4 General logarithmic and exponential functions
- §5.6 Inverse trigonometric functions
- §5.8 l'Hospital's rule

Notes:

- §5.5 Exponential Growth and Decay and §5.7 Hyperbolic Functions are optional.
- Integrals involving inverse trigonometric forms must be covered with §5.6.

Reviews and Exams (5 – 9 days)