

Standards for Calculus II

Math 173

This course introduces students to the interpretations, techniques and applications of integration.

Pre-Requisite Skills

Students will be able to

- Determine limits numerically, graphically, algebraically and analytically;
- Use the definition of the derivative to find the derivative of a function;
- Interpret the derivative as the slope of a tangent line, as velocity and as other rates of change;
- Compute derivatives of polynomials, rational functions, exponentials, logs, trigonometric functions (sine, cosine, tangent), inverse trigonometric functions (arcsine, arctangent) and combinations requiring the chain, product and quotient rules.

Performance Skills

Students will be able to

- Compute the distance given information about velocity;
- Write (not necessarily compute) a definite integral as a limit of Riemann Sums;
- Use the Fundamental Theorem of Calculus to evaluate definite integrals;
- Use the Fundamental Theorem of Calculus to evaluate an area (accumulation) function;
- Compute antiderivatives corresponding to basic differentiation formulas;
- Use integration techniques such as substitution, parts, partial fractions and trig substitution to find indefinite and definite integrals;
- Compute improper integrals;
- Set up integrals that represent quantities, such as,
 - Length of a curve;
 - Volume and/or the surface area of a solid of revolution;
 - Center of mass of a one-and/or two-dimensional object;
 - Solve simple linear first order differential equations;
 - Work to complete a task.

(Optional)

- Approximate a definite integral using the trapezoidal, midpoint and/or Simpson's Rule;
- Solve simple linear first order differential equations.

Technology

Being able to use a graphing calculator to intelligently extract information regarding functions is critical. In particular,

Students will be able to use the numerical integration function on their calculator (e.g., "fnint" on a TI-83) to find or approximate the value of a definite integral.

Pedagogical Standards

Instructors should attempt to instill certain vital problem-solving and communication skills in their students. The Mathematics Department wishes all students who successfully complete this course to possess the following skills.

Students will be able to

- Apply appropriate technology to solve problems;
- Model phenomena mathematically;
- Work cooperatively with others;
- Read and understand complex mathematical problems;
- Describe the methods used to approach a problem;
- Express solutions in written and oral form.