

**Course Objectives/Course Outline**  
**Spokane Community College**

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**Course Title:** Calculus II  
**Prefix and Course Number:** MATH& 152

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**Course Learning Outcomes:**

**By the end of this course, a student should be able to:**

- Communicate mathematical ideas in both every day and mathematical language using appropriate vocabulary and notation
- Find areas of plane regions, surface areas, and arc lengths
- Find volumes of surfaces of revolutions using the disk, washer, and shell methods
- Find derivatives and integrals of logarithmic, exponential, and inverse trigonometric functions
- Demonstrate the ability to integrate more complicated functions using standard methods of integration, including integration by parts, trigonometric substitutions, partial fractions, and tables/technology
- Apply calculus in order to solve work-related and other physics applications.
- Solve entry-level differential equations
- Judge the reasonableness of a solution and justify all processes used to obtain the solution

**Course Outline:**

**I. APPLICATIONS OF INTEGRALS**

1. Volumes by Slicing
2. Volumes Using Cylindrical Shells
3. Lengths of Plane Curves
4. Applications to Work
  - a. Springs
  - b. Pumping/Lifting
5. Fluid Forces
6. Moments and Centers of Mass
7. Other Physics Applications

**II. TRANSCENDENTAL FUNCTIONS**

1. Logarithms
  - a. Definition of  $\ln x$
  - b. Derivatives and Integrals of Logarithms
2. Exponential Functions
  - a. Derivatives
  - b. Integrals
3. Derivatives of Inverse Trigonometric Functions
4. Integrals Resulting in Inverse Trigonometric Functions
5. Hyperbolic Functions
  - a. Inverse Hyperbolic Functions
  - b. Derivatives of Hyperbolic Functions
  - c. Integral Formulas for Hyperbolic Functions

- d. Derivatives of Inverse Hyperbolic Functions
- e. Integrals Resulting in Inverse Hyperbolic Functions

### **III. Introduction to DIFFERENTIAL EQUATIONS**

- 1. Slope Fields
- 2. First-Order Separable Differential Equations
- 3. Linear First-Order Differential Equations
- 4. Euler's Method
- 5. Applications of Differential Equations (e.g. Exponential Change, Heat Transfer, Population Models)

### **IV. METHODS OF INTEGRATION**

- 1. Integration by Substitution
- 2. Integration by Parts
- 3. Integration Using Partial Fractions
- 4. Trigonometric Substitutions into Integrals
- 5. Using Tables of Integrals
- 6. L'Hôpital's Rule
- 7. Improper Integrals

### **V. POLAR COORDINATES AND GRAPHS**

- 1. Slope of Polar Curves
- 2. Tangents
- 3. Area in Polar Coordinates