

# Virginia Western Community College

## MTH 261

### Applied Calculus I

#### Prerequisites

Completion of MTH 161, MTH 167 or equivalent with a grade of C or better.

#### Course Description

Introduces limits, continuity, differentiation and integration of algebraic, exponential and logarithmic functions and techniques of integration with an emphasis on applications in business, social sciences and life sciences.

**Semester Credits: 3**

**Lecture Hours: 3**

#### Required Materials

##### **Textbook:**

Calculus and its Applications. Bittinger, Ellenbogen & Surgent. 2nd edition. Pearson. ISBN: 9780134122588.

##### **Other Required Materials:**

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#### Course Outcomes

**At the completion of this course, the student should be able to:**

- Evaluate limits and interpret them graphically.
- Determine the derivatives of algebraic, exponential and logarithmic functions.
- Solve applied problems with derivatives.
- Use derivatives to determine the graphical properties of functions.
- Apply derivatives to solve exponential growth and decay problems.
- Determine indefinite integrals.

#### Topical Description

##### Section

##### Topic

1.1

Limits : A numerical and graphical approach

1.2

Algebraic limits and Continuity

1.3

Average Rate of Change

1.4

Differentiation using limits of difference quotients

1.5

Differentiation techniques : The power and sum-difference techniques

- 1.6 Differentiation techniques ; Product/quotient rules
- 1.7 Chain Rule
- 1.8 Higher order derivatives
  
- 2.1 Using 1<sup>st</sup> derivatives to find max/min values and sketch graphs.
- 2.2 Using 2<sup>nd</sup> derivatives to find max/min values and sketch graphs
- 2.3 Graph sketching : Asymptotes and Rational Functions
- 2.4 Using derivatives to find absolute mx/min values
- 2.5 Max/min problems; Business and economics applications
- 2.6 Marginals and differentials
- 2.7 Implicit differentiation and related rates
  
- 3.1 Exponential functions
- 3.2 Logarithmic functions
- 3.3 Applications : Uninhibited and limited growth models
- 3.4 Applications : Decay
- 3.5 The derivatives of exponential and logarithms base a
- 3.6 Elasticity of demand
  
- 4.1 Antidifferentiation
- 4.2 Antiderivatives as areas
- 4.3 Area and definite integrals
- 4.4 Properties of definite integrals
- 4.5 Integration Techniques : Substitution

### **Notes to Instructors:**

The final exam must be comprehensive.