

AVENTA LEARNING

Course Description

MATHEMATICS: CALCULUS

COURSE DESCRIPTION: This course introduces limits, differentiation, and integration of functions. Students will find and evaluate finite and infinite limits graphically, numerically, and analytically. They will find derivatives using a variety of methods including The Chain Rule and Implicit Differentiation. They will use the First Derivative Test and The Second Derivative Test to analyze and sketch functions.

Subsequently, students will find antiderivatives using a variety of methods including substitution. They will evaluate integrals using a variety of methods including numerical integration. They will understand and apply Riemann sums, definite integrals, and The Fundamental Theorem of Calculus. In particular, they will differentiate and integrate logarithmic, exponential, and inverse trigonometric functions. They will solve simple differential equations that can be solved by separation of variables and use them to solve applied problems. They will use integration to determine the area between two curves, volume, and surface area. Finally, they will apply integration to determine work, center of mass, and fluid force.

The use of a graphing calculator is considered an integral part of the course and students will use a graphing calculator throughout this course.

PREREQUISITES: Pre-Calculus

COURSE LENGTH: Two Semesters, 1.0 Credit

REQUIRED TEXT: Calculus Eighth Edition, Houghton Mifflin, 2006

COURSE OUTLINE:

Unit 4 - Applications of Differentiation

Unit 1 - Course Overview

- Section 1 - Course Introduction
- Section 2 - Getting Started
- Section 3 - Research Papers

Unit 2 - Limits and Their Properties

- Section 1 - Limits and Their Properties
- Section 2 - Linear Models and Rates of Change
- Section 3 - Functions, Graphs of Functions, and Finding Models to Data
- Section 4 - Finding Limits Graphically, Numerically, and Analytically
- Section 5 - Continuity, One-Sided Limits, and Infinite Limits
- Section 6 - Exam Preparation

Unit 3 - Differentiation

- Section 1 - Differentiation and Implicit Differentiation: Introduction
- Section 2 - The Derivative
- Section 3 - Differentiation
- Section 4 - Implicit Differentiation
- Section 5 - Exam Preparation

Section 1 - Applications of Differentiation: Introduction

Section 2 - Extrema and The Mean Value Theorem

Section 3 - Derivative Tests, Limits, and Graphs

Section 4 - Optimization, Newton's Method, and Differentials

Section 5 - Exam Preparation

Semester 1 Exam

Unit 6 - Integration

Section 1 - Integration: Introduction

Section 2 - Antiderivatives and Indefinite Integration

Section 3 - Area, Riemann Sums, and Definite Integrals

Section 4 - The Fundamental Theorem of Calculus

Section 5 - Integration by Substitution and Numerical Integration

Section 6 - Exam Preparation

Unit 7 - Logarithmic, Exponential, and other
Transcendental Functions

- Section 1 - Logarithmic, Exponential, and other
Transcendental Functions: Introduction
- Section 2 - The Natural Logarithmic Function
- Section 3 - Inverse Functions and Exponential
Functions
- Section 4 - Inverse Trigonometric Functions
- Section 5 - Hyperbolic Functions
- Section 6 - Exam Preparation

Unit 8 - Differential Equations

- Section 1 - Differential Equations: Introduction
- Section 2 - Slope Fields, Euler's Method, and
Growth and Decay
- Section 3 - Separation of Variables and First
Order Linear Differential Equations
- Section 4 - Exam Preparation

Unit 9 - Applications of Integration

- Section 1 - Applications of Integration:
Introduction
- Section 2 - Area of a Region Between Two
Curves
- Section 3 - Volumes, Arc Lengths, and
Surfaces
- Section 4 - Work, Moments, and Fluids
- Section 5 - Exam Preparation

Semester 2 Exam

