

MAT 221 DCC Calculus Course Outline

Required Texts:

Preliminary Instruction Mathematica 10

by Halsey

2016

DCC

Calculus: Single Variable Custom (Calculus Concepts & Contexts w/WebAssign)

by Stewart

Edition 2009

Cengage **OR**

Calculus Concepts & Contexts, Chapters 1-8,

E-book w/WebAssign Multi-term

by Stewart

Edition 4th

Cengage

CALCULUS HONORS (DCC MAT 221 - 4 CREDITS)

Code: Full Year (12) (1 credit)

Prerequisite: Precalculus or Honors Precalculus (DCC MAT 185)

(rank weight 5.00)

Note: This course is college calculus. Topics include limits, derivatives, applications of derivatives and integration. There is an emphasis on the technical writing needed for it to be a true STEM course. Students will become proficient in presenting their mathematics as technical documents written in Mathematica a program which will be taught simultaneously with the course material.

Topical Outline:

Chapter 1 – Functions and Models

1.1 Four ways to Represent a Function

1.2 Mathematical Models: A catalog of Essential Functions

1.3 New Functions from Old Functions

1.4 Graphing Calculators and Computers

1.5 Exponential Functions

1.6 Inverse Functions and Logarithms

1.7 Parametric Curves

1A Mathematica Introduction

1B Learning to be technical writers

Review

Chapter 1 Exam

Chapter 2 Limits and Derivatives

2.1 The tangent and Velocity Problems

2.2 The limit of a function

2.3 Calculating limits Using the limit Laws

2.4 Continuity

2.5 Limits Involving Infinity

2.6 Derivatives and Rates of Change

2.7 The Derivative as a Function

2.8 What does f' say about f ?

Review

Test

Chapter 3 Differentiation Rules

3.1 Derivatives of Polynomials and Exponential Functions

3.2 The Product and Quotient Rules

3.3 Derivatives of Trigonometric Functions

3.4 The Chain Rule
3.5 Implicit Differentiation
3.6 Inverse Trigonometric Functions and Their Derivatives
3.7 Derivatives of Logarithmic Functions
3.8 Rates of Change in the Natural and Social Sciences
3.9 Linear Approximations and Differentials
Review

Test

Chapter 4 Applications of Differentiation

4.1 Related Rates
4.2 Maximum and Minimum Values
4.3 Derivatives and the Shapes of Curves
4.4 Graphing with Calculus and Calculators
4.5 Indeterminate Forms and L'Hospital's Rule
4.6 Optimization Problems
4.7 Newton's Method

Review

Test

Chapter 5 Integration

5.1 Areas and Distances
5.2 The Definite Integral
5.3 Evaluating Definite Integrals
5.4 The Fundamental Theorem of Calculus

Review

Test

Extensions to Calculus 1 –

5.5 Integration by Substitution
5.6 Integration by Parts
5.7 Additional Techniques of Integration
5.8 Integration Using Computer Algebra Systems
5.9 Approximate Integration
5.10 Improper Integration
Applications to Integration

6.2 Volumes

6.5 Average Value of a function

Differential Equations

7.1 Modeling with Differential Equations

7.2 Slope Fields and Euler's Method

7.3 Separable Equations

7.4 Exponential Growth and Decay

Final Review

FINAL EXAM AND PROJECT

