# MATH 200X, 201X AND 202X SYLLABUS GUIDES

## Revised for use with Larson and Edwards' *Calculus Early Transcendental Functions 5th edition*

### Introduction

Larson and Edwards' text treats some subjects in a sufficiently different order from the Stewart text that instructors should be aware of, please see the comments below. In addition, it is the textbook adoption committee's recommendation that some shifting of course content happen as well (as you will see below in the topics lists). Probably the most glaring change of either type is that L'Hospital's rule will not happen in Calculus I, but instead is now grouped with the discussion of integration techniques and improper integration in Calculus II. An additional caution is that the authors move the development of some topics to the exercises that instructors may wish to introduce in lecture. A good example of this is the comparison test for improper integrals in section 8.8.

Here are the textbook selection committee's recommendations for the division of sections and recommended coverage by course.

Optional sections are indicated with a $\star$. Sections which you should expect to spend more than a day on are marked with a $\diamond$; sections that may be treated more lightly are marked with a †.

### Math 200X

**Chapter 1.**

1.1 Graphs and Models †
1.2 Linear Models and Rates of Change †
1.3 Functions and Their Graphs †
1.4 Inverse Functions †
1.5 Eponential and Logarithmic Functions †

Please note that this is a review of prerequisite material for the course and as such may be treated lightly. Instructors will typically spend about one week on this material.

**Chapter 2.**

2.1 A Preview of Calculus †
2.2 Finding Limits Graphically and Numerically
2.3 Evaluating Limits Analytically - Note that the material on $\epsilon\delta$ definitions may be treated lightly.
2.4 Continuity and One-Sided Limits
2.5 Infinite Limits

**Chapter 3.**

3.1 The Derivative and the Tangent Line Problem
3.2 Basic Differentiation Rules and Rates of Change
3.3 Product and Quotient Rules and Higher-Order Derivatives
3.4 The Chain Rule
3.5 Implicit Differentiation $\diamond$ - Note that logarithmic differentiation is subsumed into this topic.
3.6 Derivatives of Inverse Functions $\diamond$
3.7 Related Rates $\diamond$
3.8 Newton's Method

**Chapter 4.**

4.1 Extrema on an Interval ⋄
4.2 Rolle's Theorem and the Mean Value Theorem
4.3 Increasing and Decreasing Functions and the First Derivative Test ⋄
4.4 Concavity and the Second Derivative Test ⋄
4.5 Limits at Infinity
4.6 A Summary of Curve Sketching
4.7 Optimization Problems ⋄
4.8 Differentials

**Chapter 5.**

5.1 Antiderivatives and Indefinite Integration
5.2 Area ⋄
5.3 Riemann Sums and Definite Integrals ⋄
5.4 The Fundamental Theorem of Calculus ⋄
5.5 Integration by Substitution ⋄
5.6 Numerical Integration
5.7 The Natural Logarithmic Function: Integration
5.8 Inverse Trigonometric Functions: Integration
5.9 Hyperbolic Functions ⋆.

Note that Sections 5.7 and 5.8 function as continuations of the material in section 5.5, and so instructors may wish to do them before section 5.6 for the sake of continuity.

MATH 201X

**Chapter 7.** *At least one* of 7.6 and 7.7 should be covered. Please note that centers of mass also make an appearance in the curriculum for Calculus III.

7.1 Area of a Region Between Two Curves
7.2 Volume: The Disk Method
7.3 Volume: The Shell Method
7.4 Arc Length and Surfaces of Revolution ⋄
7.5 Work
7.6 Moments, Centers of Mass, and Centroids ⋆
7.7 Fluid Pressure and Fluid Force ⋆

**Chapter 8.**

8.1 Basic Integration Rules
8.2 Integration by Parts ⋄
8.3 Trigonometric Integrals ⋄
8.4 Trigonometric Substitution ⋄
8.5 Partial Fractions
8.6 Integration by Tables and Other Integration Techniques ⋆
8.7 Indeterminate Forms and L'Hospital's Rule
8.8 Improper Integrals

**Chapter 9.** Please note that there are some differences in the coverage here from that in Stewart. In particular, Taylor polynomials are introduced before (and as a motivation for) power series.

9.1 Sequences
9.2 Series and Convergence ⋄
9.3 The Integral Test and $p$-series ⋄
9.4 Comparison's of Series ⋄

9.5 Alternating Series
9.6 The Ratio and Root Tests ◇
9.7 Taylor Polynomials and Approximation
9.8 Power Series ◇
9.9 Representations of Functions by Power Series ◇
9.10 Taylor and Maclaurin Series ◇

**Chapter 10.**

10.1 Conics and Calculus †
10.2 Plane Curves and Parametric Equations
10.3 Parametric Equations and Calculus
10.4 Polar Coordinates and Polar Graphs
10.5 Area and Arc Length in Polar Coordinates
10.6 Polar Equations of Conics and Kepler's Laws ⋆

MATH 202X

**Chapter 11.**

11.1 Vectors in the Plane
11.2 Space Coordinates and Vectors in Space
11.3 The Dot Product of Two Vectors
11.4 The Cross Product of Two Vectors in Space
11.5 Lines and Planes in Space
11.6 Surfaces in Space
11.7 Cylindrical and Spherical Coordinates

**Chapter 12.**

12.1 Vector-Valued Functions
12.2 Differentiation and Integration of Vector-Valued Functions
12.3 Velocity and Acceleration
12.4 Tangent Vectors and Normal Vectors
12.5 Arc Length and Curvature

**Chapter 13.**

13.1 Introduction to Functions of Several Variables
13.2 Limits and Continuity
13.3 Partial Derivatives
13.4 Differentials
13.5 Chain Rules for Functions of Several Variables
13.6 Directional Derivatives and Gradients
13.7 Tangent Planes and Normal Lines
13.8 Extrema of Functions of Two Variables
13.9 Applications of Extrema of Functions of Two Variables
13.10 Lagrange Multipliers

**Chapter 14.**

14.1 Iterated Integrals and Area in the Plane
14.2 Double Integrals and Volume
14.3 Change of Variables: Polar Coordinates
14.4 Center of Mass and Moments of Inertia
14.5 Surface Area
14.6 Triple Integrals and Applications

14.7 Triple Integrals in Cylindrical and Spherical Coordinates
14.8 Change of Variables: Jacobians

**Chapter 15.** While all of the sections in this chapter are to be considered optional, the expectation is that only sections 1 through 3 might normally be covered (if at all). This is consistent with current practice using Stewart.

15.1 Vector Fields ⋆
15.2 Line Integrals ⋆
15.3 Conservative Vector Fields and Independence of Path ⋆
15.4 Green's Theorem ⋆
15.5 Parametric Surfaces ⋆
15.6 Surface Integrals ⋆
15.7 Divergence Theorem ⋆
15.8 Stoke's Theorem ⋆