Tentative Weekly Schedule: Calculus with Review II, Spring 2018

Week 1:

We discuss limits and derivatives, including motivation and applications such as optimization.

Precalculus Emphasis: Functions, polynomials, simplifying rational expressions

Week 2:

Seeing that the tangent line lies close to the graph, we develop the notion of linear approximation. We then see how information from the first and second derivatives allows us to sketch an accurate graph of the function.

Precalculus Emphasis: Solving equations, inequalities, graphs of functions, equations of lines, quantitative reasoning

Week 3:

We spend a little more time graphing more complicated functions, then discuss Implicit Differentiation, a method for calculating the derivative of implicitly defined functions.

Precalculus Emphasis: Inequalities, graphs of functions, solving formulas, quantitative reasoning

Week 4:

We discuss one more technique of differentiation, Logarithmic Differentiation. We then review for the first midterm of the semester.

Precalculus Emphasis: Inverse functions, properties of logarithms and exponentials

Week 5:

We discuss the inverse trigonometric functions and their derivatives, as well as derivatives of inverse functions in general.

Precalculus Emphasis: Trigonometry, inverse trigonometric functions, inverse functions, trigonometric identities, graphical reasoning

Week 6:

The interpretation of derivatives as measuring `rates of change', along with our work on Implicit Differentiation, leads us to Related Rates.

Precalculus Emphasis: co-variation of quantities, function composition, trigonometry, areas and volumes of common geometric shapes

Week 7:

Since derivatives were defined in terms of limits, they can occasionally be useful in evaluating limits. We study L'Hopital's Rule for evaluating indeterminate forms.

Precalculus Emphasis: Domains, vertical asymptotes, graphical and analytical reasoning, exponentials, properties of logarithms

Week 8:

We have spent a lot of time learning how to take the derivative of a function. We begin the week by asking the reverse question, ``What function has this as its derivative?" That is, we talk about antiderivatives. We then review for our second midterm.

Precalculus Emphasis: Rational functions, distributive laws

Week 9:

We use rectangles to approximate the area under a curve. Then we define the definite integral and approximate it using a small number of rectangles.

Precalculus Emphasis: Analytic geometry, simplifying expressions, distributive laws

Week 10:

We introduce sigma notation to help with our area approximations. This allows us to use MANY rectangles in the approximations, giving us more accurate results. Then we see what happens as we take the limit.

Precalculus Emphasis: Summation notation, analytic geometry, simplifying expressions

Week 11:

The Fundamental Theorem of Calculus (in two forms).

Precalculus Emphasis: Definition of functions, simplifying expressions, function composition

Week 12:

Definite integrals have many applications. We discuss some of these, then review for Midterm 3.

Precalculus Emphasis: Quantitative reasoning, even and odd functions

Week 13:

We discuss our main integration technique, substitution, for both indefinite and definite integrals.

Precalculus Emphasis: Function composition, simplifying expressions, domains, transformations

Week 14:

We review for the cumulative final exam.