Calculus Two

Course description: (3 credits) Build on the students’ basic understanding of functions, derivatives and integrals acquired in calculus two. Solidify knowledge of basic calculus and its concepts.

Goals:

1. Become more comfortable using logarithmic, exponential and trigonometric functions.

2. Learn to represent a function by a series, use formal manipulation to solve problems, apply to approximation.

3. Learn how calculus operations and series combine to form a powerful method in various applications.

4. Use the study of elementary differential equations as a model and as a means to review calculus, especially the relationship between derivatives and the shape of a function.

5. To illustrate the power of differential equations as a model of various processes.

6. Use technology to aid in problem-solving and visualization of functional relationship. Learn to use w/out being first prompted to use by faculty.

7. Learn to read material on own. (Material should be regularly assigned to be read, but not covered (formally) in class. Problems and/or projects should require students to read material on their own.)

1. Review of Calculus

   (a) Review of def of derivative, def of integral, fundamental theorem (emphasis on concepts)
   (b) Review of slope - acceleration-derivative connections
   (c) Setting up integral problems \( (\sum f(x_i) \Delta x \rightarrow \int f(x)\,dx) \)
   (d) Integration by parts
   (e) Numerical integration

2. Intro to DE (w/emphasis on review of concepts of calculus)

   (a) modeling
   (b) direction fields (Euler’s method//linear approx.)
   (c) Separable equations (exponential growth and decay)
   (d) linear equations
   (e) Quantitative analysis (logistic type)
(f) Second order homogeneous (trig and exp review)

Series and sequences: Emphasis on Taylor and Fourier expansions and applications

(a) Convergence idea
(b) geometric series
(c) Comparison test
(d) Alternating series and error.
(e) Ratio test for power series
(f) Taylor expansion
(g) Fourier expansion