Calculus Three

Course description: (3 credits) This course will solidify students’ knowledge of calculus through its extensions to higher dimensions and other representations.

Goals:
1. Compare similarities and differences in one and higher dimensions.
2. Learn to visualize functional relations in higher dimensions via graphical aids.
3. Be able to model problems requiring more than two variables of interest.
4. Understand linear approximation in this interesting case.
5. Illustrate the process of generalizing from specific to general.
6. Use an advanced computational platform to study three dimensional graphs, allow students to focus on concepts rather than manipulation, and provide opportunity to model realistic situations.
7. Gain confidence in using calculus to model a variety of problems.
8. Take a closer look at limits, continuity and the basic definitions.
9. Reinforce good study habits. Continue to make students independent learners of mathematics.

Topics:
1. Introduction to higher dimensional graphs
   (a) parametric curves (graphing, derivatives and integrals)
   (b) polar equations (sketching, integration)
   (c) conics (basic forms, sketching)
   (d) three dimensional graphs
   (e) cylindrical and spherical coordinates
2. Partial Derivatives
   (a) limits and continuity
   (b) partial derivatives
   (c) linear approximation
   (d) chain rule
   (e) directional derivatives
   (f) max/min (as application - not topic)
   (g) Lagrange Multipliers (concept and application)
3. Multiple Integration (Ch 16)