MA 1115 — MULTIVARIABLE CALCULUS (4-0)
Objectives

Text: *Calculus (Early Transcendentals)*, 5th Edition, James Stewart (Brooks Cole 2003, ISBN 0-534-39321-7)

Upon completion of this course, the student should be able to satisfy the following objectives.

1. Given parametric equations for a curve in 2-D or 3-D, find the arclength or (2-D) sketch the curve or find slope and concavity.
2. Identify quadratic equations in two variables with corresponding conic curves, or in three variables with quadric surfaces; sketch them.
3. Convert points or equations between Cartesian, cylindrical, and spherical coordinates in 3-D, or between Cartesian and polar coordinates in 2-D; sketch polar curves.
4. Apply vector operations (addition, scalar multiplication, dot and cross products) to solve geometric or applied problems.
5. Given the position vector function of time, find velocity and acceleration, or vice versa; identify and interpret tangential and normal components of acceleration.
6. For a function of 2 or 3 variables, find the domain and range; find and sketch level sets.
7. Determine limits and continuity of functions of 2 or 3 variables.
8. Calculate and interpret first and second partial derivatives; for composite functions, apply the chain rule.
9. Find and apply the linearization of a function of 2 or 3 variables.
10. Find, interpret, and apply the gradient of a function of 2 or 3 variables.
11. Find and classify critical points of a function of 2 variables as maxima, minima, or saddle points; find absolute extrema over a closed bounded domain.
12. Optimize (maximize/minimize) a function with given constraint(s), using the method of Lagrange Multipliers.
13. Evaluate double and triple integrals; be able to change the order of integration or change coordinates.
14. Use double and triple integrals to solve applied problems.