Math 371: Finite Mathematics and Calculus I   (4-0-4)
November 2, 2015

Catalog Description: Linear functions, matrices, linear programming, mathematics of finance, derivatives and their applications. The integral and its applications, calculus of several variables. (MATH 371 can not be used for graduation credit by students who have taken MATH251.)

Prerequisite: MATH 111 with grade C or better.

Course Objectives: After completing this course, students will be able to:

1. Model using non-trigonometric mathematical functions.

2. Use differential calculus on non-trigonometric functions to analyze business problems.

3. Use linear programming with linear algebra to solve problems.

Learning Outcomes and Performance Criteria

1. Model using non-trigonometric mathematical functions.
   Core Criteria:

   (a) Graph profit, cost and revenue functions.
   (b) Graph supply and demand functions.
   (c) Evaluate functions and interpret the answer in the context of a given business application.
   (d) Given a dependent variable, evaluate the independent variable and interpret the answer in the context of a given business application.
   (e) Interpret points on a graph in the context of an application.
   (f) Interpret the solution of a system of equations representing demand and supply.
   (g) Derive functions representing business relationships.
   (h) Use composition of functions to derive models of processes that vary with respect to time.
   (i) Use polynomial, exponential, logarithmic and piece-wise function to represent models.

   Additional Criteria:

   (j) Derive functions representing competitive and monopolistic price models.

2. Use differential calculus on non-trigonometric functions to analyze business problems.
   Core Criteria:

   (a) Compute and interpret average rates of change for polynomial functions.
   (b) Compute derivatives of polynomial, exponential and logarithmic functions.
   (c) Use the product rule, chain rule and quotient rule and interpret results.
   (d) Use properties of derivatives to locate and interpret optimum points for various functions.
   (e) Use constrained optimization with nonlinear objective function to identify optimal solutions.
   (f) Calculate marginal revenue and marginal cost functions.

Additional Criteria:

(g) Find instantaneous rates of change in appropriate applications.

3. Use linear programming with linear algebra to solve problems.

Core Criteria:

(a) Use matrix operations to represent business problems.

(b) Solve a system of linear equations using Gaussian elimination.

(c) Set-up the dual problem in the context of an optimization application.

(d) Interpret the solution to an inequality and a system of inequalities.

(e) Use the simplex method to solve problems (by hand).

(f) Calculate and interpret the allowable range of the coefficients of the objective function.

(g) Calculate and interpret the range of movement in parameters on the right hand side of the objective equation.

(h) Calculate and interpret shadow prices.

Additional Criteria:

(i) Use other methods besides the simplex method to solve for example the transportation problem, the assignment problem, and integer programming.