

**J. Sargeant Reynolds Community College  
Course Content Summary**

**Course Prefix and Number:** MTH 277

**Credits:** 4

**Course Title:** Vector Calculus

**Course Description (including lecture hours, lab hours, total contacts)**

Presents vectors and the geometry of space, vector valued functions, multivariable functions, partial derivatives, multiple integrals, line integrals, and topics from the calculus of vectors. Designed for mathematical, physical, and engineering science programs. Lecture 4 hours per week.

**General Course Purpose**

Prepares students for upper level mathematics and engineering courses.

**Course Prerequisites/Corequisites** (*Entry-level competencies **required** for enrollment*)

Prerequisite: MTH 174 or equivalent.

**Course Objectives** (Each item should complete the following sentence.)

Upon completing the course, the student will be able to:

- a. Perform the algebra of vectors in space including the dot and cross products.
- b. Write the equations of lines and planes in space.
- c. Convert from rectangular to cylindrical or spherical coordinates.
- d. Differentiate and integrate vector-valued functions.
- e. Find tangent and normal vectors to curves in space.
- f. Use vector-valued function in applications.
- g. Determine limits of functions of several variables.
- h. Find partial derivatives.
- i. Use partial derivatives to find directional derivatives, gradients, and, extrema of functions of several variables.
- j. Evaluate multiple integrals using rectangular, polar, cylindrical, or spherical

**Major Topics to be Included**

- a. Vectors and the Geometry of Space
- b. Vector-Valued Functions
- c. Functions of Several Variables
- d. Multiple Integration
- e. Vector Analysis

**Effective Date of Course Content Summary:** April 7, 2009