

MTH 254 : VECTOR CALCULUS I

Transcript title

Vector Calculus I

Credits

4

Grade mode

Standard letter grades

Contact hours total

60

Lecture hours

30

Lab hours

30

Recommended preparation

MTH 253.

Description

Introduces concepts of vector calculus to science and engineering students. Includes vectors and vector functions, parametric curves, functions of several variables, partial derivatives, gradients, directional derivatives and optimization problems. A graphing calculator is required. TI-83 or TI-84 is recommended. Computer skills required.

Learning outcomes

1. Students will perform basic vector operations such as addition, subtraction, scalar multiplication, dot and cross products.
2. Students will understand and use the geometric properties of the basic vector operations.
3. Students will find the equations of lines, planes, and surfaces in space.
4. Students will differentiate and integrate vector-valued functions.
5. Students will find tangent and normal vectors to a curve in space.
6. Students will find the arc-length and curvature of a curve in space.
7. Students will differentiate functions of several variables by partial differentiation.
8. Students will find and apply directional derivatives and the gradient of a function of two or three variables.
9. Students will use partial derivatives to find tangent planes, normal lines, and extrema of functions of two variables.
10. Students will use Lagrange Multipliers to solve optimization problems.
11. Students will use a computer algebra or 3D graphing system to deepen understanding of vector calculus.

General education/Related instruction lists

- Science not Lab
- Mathematics