MATH 2001 Vector Calculus and Complex Variables (Pure and Applied, Normal)

_May not be counted with MATH 2901._

8 contact hours per week (Summer School), 4 per week (Semester 1).

_Pre-requisite:_ (MATH 1001 or 1901 or 1906) and (MATH 1002 or 1902) and (MATH 1003 or 1903 or 1907)

The first section of this unit is a study of functions of several variables from a vector point of view. It builds on the work covered in the calculus and vector components of junior mathematics. Vector calculus is indispensable as a mathematical tool for the study of various physical phenomena in many areas of science and engineering.

Topics include:
- Line integrals, multiple integrals, surface integrals, conservative fields, divergence, curl, flux, and the theorems of Green, Gauss and Stokes.
- The second part of the unit is an introduction to the theory of functions of complex variables, often considered as one of the most elegant theories of mathematics. The emphasis is on integration, and topics include:
- The Cauchy-Riemann conditions, contour integration, Cauchy’s Integral Theorem and Cauchy’s Integral Formula, residue theory and its application to evaluating certain real integrals.

This unit is a prerequisite for MATH 2004, and is good preparation for MATH 2005, 2007, 3003, 3008 and 3010.

**Course notes:**

**References:**
- Britton, S., Coleman, C., Henderson, J., _the little blue book._