

## MATH 140

(GQ) **Calculus With Analytic Geometry I** (4) Functions, limits; analytic geometry; derivatives, differentials, applications; integrals, applications.

Students may only take one course for credit from MATH 110, 140, 140A, 140B, and 140H.

**Prerequisite:** [MATH 022](#), [MATH 026](#) ; or [MATH 040](#) or [MATH 041](#) or satisfactory performance on the mathematics proficiency examination

### Topics

#### Limits

Tangent & Velocity Problems

Limit of a function

Calculating limits using properties of limits and/or limit laws

Continuity(including the Intermediate Value Theorem)

#### Derivatives

Limit definition of the derivative(including the definition and concept of differentiability and the derivative as a function)

Differentiation Formulas

Rates of Change in the Natural & Social Sciences

Derivatives of Trigonometric Functions

Chain Rule

Implicit Differentiation

Higher Order Derivatives

Related rate problems

Linear approximations and Differentials

## **Applications of Differentiation**

Maximum and Minimum Values: Local(relative) and global(absolute) extrema and the Extreme Value Theorem

Mean Value Theorem

Local extrema and inflection points

Asymptotes and limits at infinity

Curve sketching

Optimization Problems

## **Integration**

Antiderivatives

Limit definition of area under a graph

Definite Integral

Fundamental Theorem of Calculus

Substitution method of integration

## **Applications of Integration**

Area Enclosed By Two Graphs

Volumes of rotation-Disk method

Volumes of rotation-shell method