Course Information Form (CIF)

Course Code: MAT 228 (IAI M1 900-3, MTH 903)

Course Title: Calculus and Analytic Geometry III

Department: Mathematics
PCS Code: 1.1 - Baccalaureate/Transfer
CIP Code: 27.0101
Repeatability: 0

Effective Date: Summer 2026

Credit Hours

Catalog Notation: 4-0-4
Credit Hour Distribution:

Lecture: 4	Lab: 0	Clinical: 0	**Total: 4**

General Course Information

Catalog Description

Three-dimensional vectors, solid analytic geometry, vector-valued functions, partial derivatives, multiple integrals, line integrals, Green's theorem, surface integrals, divergence theorem, and Stokes' theorem.

General Course Objectives

Students will understand the structure and properties of three-dimensional space; and will understand calculus operations and applications in the context of three dimensions (including limits, partial derivatives, gradient vectors, multiple integrals, and line integrals). Graphing calculator usage is integrated throughout the course.

Minimum Placement Levels

English	Reading	Math
None	None	None

Prerequisites

Credit in MAT 129 with a grade of C or higher, or placement

Methods of Evaluation

4-5 exams, 5-15 quizzes and homework, and a cumulative final exam.

Instructional Materials and Additional Supplies

Precalculus, Functions and Graphs, 13th edition, by Swokowski and Cole; Cengage Learning, 2019.
9781337552332 - Print Text
Required: TI-89 or TI-Nspire CX CAS graphing calculator; $160.

Course Content

General Learning Outcomes (GLOs)

- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Vectors	1. Perform these operations with vectors: addition, scalar multiplication, and dot and cross products. 2. Solve application problems involving vectors. 3. Use vectors to find the equations of lines and planes in 3-space.	6	0	0
Solid Analytic Geometry and Vector-Valued Functions	1. Interpret the graphs of functions of two variables. 2. Determine the traces of cylindrical and quadric surfaces. 3. Determine and apply vector-valued functions to solve problems involving velocity, acceleration, arc length, and curvature.	8	0	0
Partial Derivatives	1. Define limits and continuity of a function of two variables. 2. Determine the partial derivative of a function of several variables. 3. Use the chain rule for partial derivatives. 4. Determine the total differential of a function, and use it to make approximations. 5. Calculate gradients of functions of two and three variables. 6. Determine the directional derivative of a function of two or three variables. 7. Determine the tangent plane to a surface at a given point. 8. Determine the relative maxima and minima of a function of two variables. 9. Use Lagrange multipliers to find maximum or minimum values of functions of several variables subject to constraints.	13	0	0
Multiple Integrals	1. Use iterated integrals to evaluate double and triple integrals. 2. Determine area, volume, mass, surface area, center of mass, and moment of inertia using double and triple integrals. 3. Set up and evaluate double integrals in polar coordinates. 4. Apply cylindrical and spherical coordinate systems. 5. Set up and evaluate triple integrals in cylindrical and spherical coordinates. 6. Apply the Jacobian to cylindrical and spherical coordinate transformations.	13	0	0
Line Integrals	1. Apply the notion of work as a line integral. Evaluate line integrals parametrically. 2. Apply the concept and evaluation of path independent line integrals. 3. Apply Green's theorem to relate line integrals and double integrals.	4	0	0
Surface Integrals	1. Compute surface integrals and apply them to problems involving the divergence and curl of vector fields. 2. Use the divergence theorem and Stoke's theorem to evaluate surface and line integrals.	7	0	0
Review and Tests	1. Earn at least a 70 percent on each of four hour exams and the final exam.	9	0	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
60	0	0