



**Course Outline
MAC 2313
Calculus/Analytic Geometry III**

General Course Information

Common Course Number: MAC2313

Course Title: Calculus/Analytic Geometry III

Prerequisite(s): Minimum grade of C in MAC 2312

Contact Hour Breakdown: CR 4 CLASS 4 LAB 0

Discipline: Mathematics

Catalog Description: Prerequisite: Minimum grade of C in MAC 2312. Topics include polar coordinates, vectors, three dimensional analytic geometry, parametric equations, partial derivatives, multiple integration. Gordon Rule course. Minimum grade of C required if MAC 2313 is used to satisfy Gordon Rule and general education requirement.

Major Topics/ Concepts/ Skills/ Issues

- Three-Dimensional Coordinate Systems and Surfaces in Space.
- Vectors: Dot Product, Cross Product, Applications.
- Vector Functions and Parametric Equations: Derivatives and Integrals of Vector Functions, Arc Length, Curvature, Motion in Space.
- Functions of Several Variables: Definition in words, as an equation, as a table, or as a contour diagram. Domain, Range, Graph, Applications.
- Partial Derivatives: Tangent Planes, Gradient Vectors, Directional Derivatives, Applications Involving Optimization Problems and Rates of Change.
- Multiple Integrals: Multiple Integrals in Various Coordinates, Applications of Multiple Integrals.
- Vector Calculus: Vector Fields, Line Integrals, Applications.

Major Learning Outcomes with Evidence, Core Competencies and Indicators

Use vectors to solve geometric and physical problems.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> • Use vectors to solve geometric problems such as projections, angles, areas, volumes and equations of lines and planes. • Use vector functions to solve motion problems in 2 and 3 dimensions. • Use vector functions to parameterize and analyze curves in space. 	
Core Competency: Think	
Indicators	Method of Assessment
<ul style="list-style-type: none"> • employ the facts, formulas, procedures of the discipline 	<ul style="list-style-type: none"> • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project • Instructor may use one of the above assessments, or use one of their own.
Core Competency: Communicate	
Indicators	Method of Assessment
<ul style="list-style-type: none"> • employ methods of communication appropriate to your audience and purpose 	
Core Competency: Act	
Indicators	Method of Assessment
<ul style="list-style-type: none"> • implement effective problem-solving, decision-making, and goal-setting strategies 	
Use partial derivatives to analyze functions of several variables.	

Corresponding Evidence of Learning	
<ul style="list-style-type: none"> Given a function of several variables, find or approximate partial and directional derivatives, and interpret these derivatives as rates of change in context. Given a function of several variables, find tangent planes and linear approximations. Be able to do applied optimization problems involving functions of several variables. 	
Core Competency: Think	
Indicators	Method of Assessment
<ul style="list-style-type: none"> analyze data, ideas, patterns, principles, perspectives employ the facts, formulas, procedures of the discipline 	<ul style="list-style-type: none"> Knowledge recall quiz Locally developed exam/objective Locally developed multiple choice exam Problem-solving quiz Project Instructor may choose one of the above assessments, or use one of their own.
Core Competency: Communicate	
Indicators	Method of Assessment
<ul style="list-style-type: none"> employ methods of communication appropriate to your audience and purpose 	
Core Competency: Act	
Indicators	Method of Assessment
<ul style="list-style-type: none"> implement effective problem-solving, decision-making, and goal-setting strategies 	
Apply multiple integrals to solving geometric and physical problems.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> Approximate double integrals using Riemann sums and interpret in contextual situations. Calculate multiple integrals using iterated integrals. Use polar, cylindrical and spherical coordinates to solve problems involving multiple integrals. Apply multiple integrals to calculate areas and volumes. Apply multiple integrals to calculate mass, moments and centers of mass. 	
Core Competency: Think	
Indicators	Method of Assessment
<ul style="list-style-type: none"> analyze data, ideas, patterns, principles, perspectives integrate ideas and values from different disciplines employ the facts, formulas, procedures of the discipline 	<ul style="list-style-type: none"> Knowledge recall quiz Locally developed exam/objective Locally developed multiple choice exam Problem-solving quiz Project Instructor may choose one of the above assessments, or use one of their own.
Core Competency: Communicate	
Indicators	Method of Assessment
<ul style="list-style-type: none"> employ methods of communication appropriate to your audience and purpose 	
Core Competency: Act	
Indicators	Method of Assessment
<ul style="list-style-type: none"> implement effective problem-solving, decision-making, and goal-setting strategies 	
Demonstrate an understanding of vector fields and line integrals.	
Corresponding Evidence of Learning	
<ul style="list-style-type: none"> Given a vector field and a curve, calculate the line integral. Given a vector field determine whether it is conservative and if so apply the Fundamental Theorem of Line Integrals. Given a graphical representation of a vector field and a curve, approximate the line integral. Use line integrals for physical applications such as work and circulation. 	
Core Competency: Think	
Indicators	Method of Assessment
<ul style="list-style-type: none"> draw well-supported conclusions employ the facts, formulas, procedures of the discipline 	<ul style="list-style-type: none"> Knowledge recall quiz Locally developed exam/objective Locally developed multiple choice exam Problem-solving quiz Project Instructor may choose one of the above assessments, or

	use one of their own.
Core Competency: Communicate	
Indicators	Method of Assessment
<ul style="list-style-type: none"> employ methods of communication appropriate to your audience and purpose 	
Core Competency: Act	
Indicators	Method of Assessment
<ul style="list-style-type: none"> implement effective problem-solving, decision-making, and goal-setting strategies 	

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