Official Course Outline
MAC 2311
Calculus/Analytic Geometry I

General Course Information

Common Course Number: MAC2311

Course Title: Calculus/Analytic Geometry I

Prerequisite(s): Minimum grade of C in MAC 1140 and MAC 1114 or MAC 1147 or MAC 1142 or MAC 1132 or MAC 1104 and MAC 1114 or appropriate score on an approved assessment.

Contact Hour Breakdown: **CR** 5 **CLASS** 5 **LAB**

Discipline: Mathematics

Catalog Description: Prerequisite: Minimum grade of C in MAC 1140 and MAC 1114 or MAC 1147 or MAC 1142 or MAC 1132 or MAC 1104 and MAC 1114 or appropriate score on an approved assessment. Topics include circle and parabola, limits and continuity, derivatives of algebraic and trigonometric forms, applications of derivatives, definite and indefinite integral. Gordon Rule course. Minimum grade of C required if MAC 2311 is used to satisfy the Gordon Rule and general education requirements.

Major Topics/ Concepts/ Skills/ Issues

- tangent and rate of change problems
- limits and continuity
- derivatives and their applications
- optimization problems
- rectilinear motion
- integrals and their applications
- areas of regions and volumes of solids

Major Learning Outcomes with Evidence, Core Competencies and Indicators

Learning Outcome 1:

Demonstrate an understanding of the limiting process as it applies to functions, continuity, derivatives and integrals.
Corresponding Evidence of Learning

- Find limits graphically, numerically, and algebraically.
- Given a function, determine its continuity and the relationship to limits and the graph of the function.
- Given a function, apply the algebra of limits to find exact values of the derivative of the function.
- Given a function, find the exact value of the definite integral by using the limit of the Riemann sum.

Core Competency: Think

Indicators	Level of Integration	Method of Assessment
• analyze data, ideas, patterns, principles, perspectives	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project
• employ the facts, formulas, procedures of the discipline	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project
• integrate ideas and values from different disciplines	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project
• draw well-supported conclusions	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project
• revise conclusions consistent with new observations, interpretations, or reasons	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project

Core Competency: Communicate

Indicators	Level of Integration	Method of Assessment

• employ methods of communication appropriate to your audience and purpose	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project

Core Competency: Act

Indicators	Level of Integration	Method of Assessment
• apply disciplinary knowledge, skills, and values to educational and career goals	• Instruct	
• implement effective problem-solving, decision-making, and goal-setting strategies	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project

Learning Outcome 2:

Demonstrate an understanding of the concept of derivative including its geometric and physical interpretations.

Corresponding Evidence of Learning

- Approximate the derivative at a point numerically and graphically.
- Recognize the relationship between rate of change and derivative in the context of an application.
- Recognize the relationship between slope of tangent line and derivative.

Core Competency: Think

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• analyze data, ideas, patterns, principles, perspectives	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project
• employ the facts, formulas, procedures of the discipline	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project

• integrate ideas and values from different disciplines	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project
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Core Competency: Value		
Indicators	**Level of Integration**	**Method of Assessment**

• recognize mathematical values and employ them as a standard of judgement	• Instruct • Practice • Assess	• Classroom assessment technique • Group presentation • Knowledge recall quiz • Locally developed exam/objective • Locally developed multiple choice exam • Problem-solving quiz • Project

Learning Outcome 3:

Calculate derivatives of functions using rules of differentiation.		
Corresponding Evidence of Learning		
• Given a formula for an algebraic or trigonometric function choose appropriate rule(s) and apply them to find the derivative.		
Core Competency: Think		
Indicators	**Level of Integration**	**Method of Assessment**
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Learning Outcome 4:

Demonstrate an understanding of the concept of integral including its geometric and physical interpretations.		
Corresponding Evidence of Learning		
• Given a function approximate the definite integral using a Riemann sum. • Given a graph approximate the definite integral using a Riemann sum. • Solve applied problems by setting up an approximating Riemann sum and representing its limit as a definite integral.		
Core Competency: Think		
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Learning Outcome 5:

Calculate indefinite and definite integrals.

Corresponding Evidence of Learning

- Given an indefinite integral choose appropriate methods to evaluate.
- Apply the Fundamental Theorem of Calculus to evaluate definite integrals.

Core Competency: Think

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Learning Outcome 6:

Solve applied problems using derivatives and integrals.

Corresponding Evidence of Learning

- Demonstrate use of first and second derivatives in analyzing the graph of a function.
- Be able to apply derivatives in solving applied problems such as optimization, rates of change, and rectilinear motion.
- Be able to apply integrals in solving applied problems such as net change, rectilinear motion, accumulation, and work.
- Use definite integrals to calculate areas of regions and volumes with known cross sections.

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