CORE CURRICULUM COMPONENT APPLICATION
Texarkana College

Part I: Course Information

Course Type
☒ Existing/Restructured
☐ New Course

Course Prefix & Number: MATH 2413

Texas Common Course Number (TCCN): 2413

Course Title: Calculus I

Course Catalog Description

Calculus I (4,3,2). This course will include limits, continuity, derivatives, differentiation rules and rates of change, implicit differentiation and related rates, applications of derivatives, applications including analytic geometry-straight lines and conic sections, antiderivatives, definite and indefinite integration, Fundamental Theorem of Calculus, integration by substitution, and numerical integration.

Course Prerequisites: MATH 2412, or MATH 1314 and 1316

Available Online?
☐ Yes
☒ No

Part II: THECB Course Objectives

1. Develop Solutions for tangent and area problems using the concepts of limits, derivatives, and integrals.
2. Draw graphs of algebraic and transcendental functions considering limits, continuity, and differentiability at a point.
3. Determine whether a function is continuous and/or differentiable at a point using limits.
4. Use differentiation rules to differentiate algebraic and transcendental functions.
5. Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
6. Evaluate definite integrals using the Fundamental Theorem of Calculus.
7. Articulate the relationship between derivatives and integrals using the Fundamental Theorem of Calculus.

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Part III: THECB Skill Objectives

1. Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication

3. Empirical and Quantitative Skills: to include applications of scientific and mathematical concepts.

Part IV: Course Student Learning Outcomes (SLO)

1. Develop Solutions for tangent and area problems using the concepts of limits, derivatives, and integrals.
2. Draw graphs of algebraic and transcendental functions considering limits, continuity, and differentiability at a point.
3. Determine whether a function is continuous and/or differentiable at a point using limits.
4. Use differentiation rules to differentiate algebraic and transcendental functions.
5. Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
6. Evaluate definite integrals using the Fundamental Theorem of Calculus.
7. Articulate the relationship between derivatives and integrals using the Fundamental Theorem of Calculus.

Skill Objective:	**Critical Thinking Skills:** to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
THECB Course Objective	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
Course Student Learning Outcome	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
General Learning Activities	Students will collect data and demonstrate their abilities as a ***practical problem solver***, by specifically, • Synthesizing and making connections between information and arguments • Extending or transferring what is learned to new situations • Applying the steps necessary to carry out the solution strategy (effectively analyze and evaluate

	the data) Example: Collect data and use it to determine rates of change
Assessment ***Must Include Assignment & Rubric***	The assignment will be to graph data from a table as a function of time and, from the graph, determine rates of change and create a mathematical model. Students will test their models to evaluate whether they are valid by using regression capabilities on their calculator, then analyze their results. This will be assessed using the Critical Thinking Skills rubric.

Skill Objective:	**Communication Skills:** to include effective written, oral, and visual communication
THECB Course Objective	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
Course Student Learning Outcome	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
General Learning Activities	Students will collect data and demonstrate their abilities to be problem solvers and effective communicators by: • Organizing and Conveying information and ideas accurately • Choose and use multiple forms of media to convey what has been learned • Choose visual that effectively engage the audience and conveys the student's ideas
Assessment ***Must Include Assignment & Rubric***	The assignment will be for students to communicate the analysis, results, and conclusion of their data collection in a written report and a class presentation, using the media of their choice. The Communication Skills rubric will be used to assess communication skills.

Skill Objective:	**Empirical and Quantitative Skills:** to include applications of scientific and mathematical concepts.
THECB Course Objective	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and

	determine solutions to applied problems.
Course Student Learning Outcome	Identify appropriate calculus concepts and techniques to provide mathematical models of real-world situations and determine solutions to applied problems.
General Learning Activities	Students will learn to generate and interpret graph and symbolic formulae as tools for understanding both the quantitative and empirical real-world relationships of functions.
Assessment ***Must Include Assignment & Rubric***	The assignment will be to use graphing techniques to plot data on a scatter plot then apply knowledge of derivatives to find rates of change. The Empirical and Quantitative Skills rubric will be used to assess empirical and quantitative skills.