Calculus I
MATH221
Fall 2015

This standard Calculus I course is a first course in the sequence of calculus of one variable intended for undergraduate mathematics, science, technology, or engineering majors. Topics include limits, continuity, techniques and applications of differentiation, indefinite and definite integrals, and the Fundamental Theorem of Calculus. Prerequisite: C- or higher in MATH217 Precalculus; waiver by placement testing results; or departmental approval.

COURSE OUTCOMES	OUTCOMES ACTIVITIES
At the end of this course, students will be able to	
Find limits in order to develop differentiation and integration.	1. Estimate a limit numerically. (CT,TS,QS) 2. Determine a limit from a graph. (CT,TS,QS) 3. Evaluate a limit using analytic techniques. (CT,QS) 4. Find one-sided limits. (CT,TS,QS) 5. Find infinite limits and limits at infinity. (CT,T,QS) 6. Determine where limits fail. (CT,TS,QS)
Demonstrate an understanding of continuity in order to apply the concept to other topics in calculus.	1. Determine continuity at a point, on an open interval and on a closed interval. (CT,TS,QS) 2. Use properties of continuity. (CT,QS) 3. Label a discontinuity as removable or nonremovable. (CT,TS,QS)
Differentiate algebraic and trigonometric functions in order to solve applied problems.	1. Find the derivative of a function using the limit definition. (CT,QS). 2. Find the derivative of a function using the Constant Rule, Power Rule, Constant Multiple Rule, Sum and Difference Rules, Product & Quotient Rules, Chain Rule. (CT,TS,QS) 3. Find higher order derivatives. (CT,TS,QS) 4. Find the derivatives of trigonometric functions. (CT,TS,QS) 5. Find the derivative of exponential functions. (CT,TS,QS) 6. Find the derivative of logarithmic functions. (CT,TS,QS) 7. Find the derivative of an inverse trigonometric function. (CT,TS,QS) 8. Use logarithmic differentiation. (CT,TS,QS) 9. Perform implicit differentiation. (CT,TS,QS)
Solve applied problems involving differentiation.	1. Solve related rate problems. (CT,TS,QS,R,W) 2. Find the absolute extrema of a function on an interval. (CT,TS,QS) 3. Use the first and second derivative tests to find relative extrema and intervals of increase and decrease for a given function. (CT,TS,QS) 4. Find points of inflection and intervals of concavity for a given function. (CT,TS,QS) 5. Solve optimization problems. (CT,TS,QS,R,W) 6. Calculate differentials. (CT,QS,R,TS)

Use limits and approximation techniques in order to develop the definition of a definite integral.	1. Approximate area under a curve using upper and lower sums. (CT,QS,R,TS) 2. Evaluate definite integrals using the limit definition. (CT,QS,R,TS) (Light treatment)

Use numerical techniques in order to approximate a definite integral.	1. Approximate the value of a definite integral using
	
	   the midpoint rule, the trapezoidal rule, or
	
	   Simpson's rule. (CT,QS,R,TS)

Integrate algebraic and trigonometric functions in order to develop the techniques necessary to solve applied problems.	1. Use the Fundamental Theorem of Calculus to evaluate definite integrals and calculate area. (CT,QS,R,TS) 2. Use the Second Fundamental Theorem of Calculus. (CT,QS,R,TS) 3. Evaluate integrals using change of variable and substitution (CT, QS, R, TS) 4. Evaluate definite and indefinite integrals using basic integration rules including integration formulas for the six basic trigonometric functions, logarithmic and exponential functions. 5. Evaluate integrals that result in inverse trigonometric functions

**Indicate the Core Competencies that apply to the outcomes activities and assessment tools: Critical Thinking (CT); Technology Skills (TS); Oral Communications (OC); Quantitative Skills (QS); Reading (R); Writing (W).