Eastern WV Community & Technical College
Master Course Record

Course Prefix and Number: MTH 230

Course Title: Calculus I

Recommended Transcript Title: Calculus I

Date Approved/Revised: 10/5/17

Credit Hours: 4
Contact hours per week (Based on 15 week term)
Lecture: 4
Lab:

Prerequisite: MTH 135 and MTH 136 OR MTH 137 OR Math ACT score 26 or higher
Corequisite:
Pre/Corequisite:

Grading Mode: Letter Grade

Catalog Description: This course is a study of limits, continuity, derivatives and their applications, and an introduction to integration and the Fundamental Theorem of Calculus. Polynomial, rational, exponential, logarithmic, trigonometric, and other nonlinear functions will be discussed. This course is designed to be the first in a three-part sequence of differential, integral, and multivariable calculus.

Course Outcomes:

1. Evaluate limits of functions graphically, numerically, and algebraically
2. Examine the continuity of functions graphically, numerically, and algebraically
3. Compute derivatives of functions graphically, numerically, and algebraically
4. Use the derivative of a function to explore the properties of the graph of the function
5. Solve application problems involving the derivative
6. Compute definite and indefinite integrals of functions

Implementation Cycle: Fall semester

Role in College Curriculum: (Check all that apply)
X General Education Core: Mathematics
□ Technical Core (Specify Program)
□ Restricted Elective (Specify program)
□ General Elective
□ Workforce Education
□ Other (Please specify)

Course Fee: None

Instructor's Qualifications: Master's Degree with 18 graduate level mathematics credits.

Expanded Course Description:
This course is provided to students as an additional transferable math elective.

Expanded course outcomes:

1. Evaluate limits of functions graphically, numerically, and algebraically
    a. Compute the average rate of change of a function over an interval
    b. Find one-sided limits
    c. Find infinite limits and limits at infinity
    d. Identify the connection between infinite limits, limits at infinity, and asymptotes
    e. Calculate limits using the rules of limits
    f. Prove that a limit exists using the ε, δ definition of limit
    g. Use limits and asymptotes to sketch curves of various functions
2. Explore the continuity of functions graphically, numerically, and algebraically
    a. Define what it means for a function to be continuous
    b. Conclude where and how a function is continuous or discontinuous
    c. Use the Intermediate Value Theorem to explore the zeros of a function
3. Compute derivatives of functions graphically, numerically, and algebraically
    a. Find the slope of the tangent line to a curve at a specified point
    b. Find the equation of the tangent line to a curve at a specified point
    c. Use derivatives to explore instantaneous velocity and other rates of change
    d. Define the derivative of a function
    e. Find the derivative of various functions using the definition
    f. Compute derivatives using differentiation rules
    g. Use implicit differentiation to find the derivative of equations
    h. Find higher order derivatives of a function
4. Use the derivative of a function to explore the properties of the graph of the function
    a. Find the extrema of a function
    b. Use the derivative to determine where a function is increasing or decreasing
    c. Use the second derivate to determine concavity of a function
    d. Apply the concepts of asymptotes, extrema, increasing/decreasing, and concavity to sketch the graph of various functions
5. Solve application problems involving the derivative
    a. Solve related rates problems
    b. Verify Rolle's Theorem and the Mean Value Theorem for a given function
    c. Use the derivative to obtain a linear approximation of a function at a given value
    d. Evaluate limits using L'Hopital's Rule
    e. Approximate the zeros of a function using Newton's method
    f. Solve optimization problems
6. Compute definite and indefinite integrals of functions
    a. Find the antiderivative of various functions
    b. Define indefinite integral

c. Write sums in sigma notation
d. Approximate the area under a curve using a Riemann sum
e. Define definite integral as a limit of Riemann sums
f. Evaluate integrals using the Fundamental Theorem of Calculus
g. Use substitution to evaluate integrals

Prepared by: Andrea Williams, Mathematics Faculty 10/5/17

Name, Title Date

Approved Per LOT Minutes

Dean of Teaching and Learning Date