MTH180
CALCULUS I
5 Credit Hours

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MTH180: Calculus I

I. CATALOGUE DESCRIPTION

A. Prerequisite: MTH141 Precalculus with grade of “C” or better, MTH134/134H College Algebra with grade of “C” or better and MTH133 Trigonometry with a grade of “C” or better, or COMPASS Trigonometry with score of 46 or higher within the past two years, or ACT math score of 27 or higher within the past two years plus either high school trigonometry or precalculus with a grade of “C” or better, and reading proficiency

B. 5 semester hours credit

C. Calculus I covers limits, continuity, differentiation, and integration. This course meets the mathematics requirement for the Associate of Arts degree. A graphing calculator is required. Students may not apply both MTH161 and MTH180 toward graduation. (F, S, Su)

II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

<table>
<thead>
<tr>
<th>MTH180 Expected Learning Outcomes</th>
<th>Assessment Measures</th>
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<tr>
<td>Note: Calculus I deals with functions in two variables</td>
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<tr>
<td>Students will determine the derivatives and antiderivatives of algebraic and trigonometric functions by applying the appropriate rules (power, product, quotient, chain, and substitution)</td>
<td>Homework, Quizzes/tests</td>
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<td>Students will apply the tools of differentiation to solve related rate and optimization problems</td>
<td>Homework, Quizzes/tests</td>
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<tr>
<td>Students will apply the tools of integration to find areas of regions, volumes of solids, and to calculate the average value of a function</td>
<td>Homework, Quizzes/tests, Projects</td>
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<tr>
<td>Students will identify important features of a function (extrema, intervals of increase/decrease, points of inflection, limits etc.) by using derivatives of functions, and will accurately graph functions illustrating these features</td>
<td>Homework, Quizzes/tests</td>
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<td>Students will use differentiation (explicit and implicit) to find the equation of an approximating tangent line to a curve at a specified point</td>
<td>Homework, Quizzes/tests</td>
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<td>Students will determine limits of functions</td>
<td>Homework, Quizzes/tests</td>
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III. OUTLINE OF TOPICS

A. Limits and rates of change
   1. Four ways to represent a function
   2. Mathematical models
   3. New functions from old functions
   4. The tangent and velocity problems
   5. The limit of a function
   6. Calculating limits using the limit laws
   7. The precise definition of a limit
   8. Continuity

B. Derivatives
   1. Derivatives and rates of change
   2. The derivative as a function
   3. Differentiation formulas
   4. Derivatives of trigonometric functions
   5. The chain rule
   6. Implicit differentiation
   7. Rates of change in the natural and social sciences
   8. Related rates
   9. Linear approximations and differentials

C. Applications of differentiation
   1. Maximum and minimum values
   2. The Mean Value Theorem
   3. How derivatives affect the shape of a graph
   4. Limits at infinity; horizontal asymptotes
   5. Summary of curve sketching
   6. Graphing with calculus and calculators
   7. Optimization problems
   8. Newton’s Method
   9. Antiderivatives

D. Integrals
   1. Areas and distances
   2. The definite integral
   3. The fundamental theorem of calculus
   4. Indefinite integrals and the net change theorem
   5. The substitution rule

E. Applications of integration
   1. Area between curves
   2. Volumes
   3. Volumes by cylindrical shells
4. Work
5. Average value of a function

IV. METHODS OF INSTRUCTION

A. Lecture

B. Discussion

C. In-class activities

V. REQUIRED TEXTBOOK


VI. REQUIRED MATERIAL

Graphics calculator required. TI-83/84 recommended. Symbolic manipulating calculators prohibited.

VII. SUPPLEMENTAL REFERENCES

None

VIII. METHODS OF EVALUATION

A. Homework, 10%-20%

B. Classwork, 0%-20%
Worksheets and projects may be assigned, at the discretion of the instructor, to reinforce various concepts.

C. Tests, 30%-60%
There will be a minimum of three tests, each covering no more than 2 chapters of material.

D. Comprehensive final examination, 15%-25%
All students will be required to take a comprehensive final exam, the score of which must be incorporated in the final course grade.

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Library; phone 636-482-3169).
X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College website, http://www.jeffco.edu/jeffco/index.php?option=com_weblinks&catid=26&Itemid=84).