JEFFERSON COLLEGE

COURSE SYLLABUS

MTH180

CALCULUS I

5 Credit Hours

Prepared by:
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MTH180: Calculus I

I.   CATALOG DESCRIPTION

     A.   Course pre-requisites/co-requisites: MTH141 Pre-Calculus 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 pre-calculus with a grade of "C" or better, and reading proficiency

     B.   5 semester credit hours

     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)

     D.   Fulfills Mathematic Sciences for AA, AAT, AFA, AS, and select AAS degrees general education requirement, NOT part of MOTR CORE 42**.
               **Students who directly place into and successfully complete (C or better) an advanced mathematical sciences 3+ credit hour course with one of the MTH general education MOTR courses as a prerequisite meet the general education CORE 42 requirement of a minimum of 3 credit hours in Mathematical Sciences.
               Three credit hours from this course may apply to meet the Mathematical Sciences and overall total of 42 credit hours for CORE 42 completion. Credits in excess of these three apply to degree requirements/electives.
               Students have the option of having the prerequisite course credit hours posted to their transcript for the normal credit hour posting fee.
               Fulfills AS degree requirement.
               Elective course applies toward AA and AAT degree requirement.
               May not apply both MTH161 and MTH180 toward graduation.

II.   EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

     Note: Calculus I deals with functions in two variables

Expected Learning Outcomes	Assessment Measures
Students will determine the derivatives and anti-derivatives of algebraic and trigonometric functions by applying the appropriate rules (power, product, quotient, chain, and substitution)	Homework, quizzes, and tests
Students will apply the tools of differentiation to solve related rate and optimization problems	Homework, quizzes, and tests
Students will apply the tools of integration to find areas of regions, volumes of solids, and to calculate the average value of a function	Homework, quizzes, tests, and projects
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	Homework, quizzes, and tests
Students will use differentiation (explicit and implicit) to find the equation of an approximating tangent line to a curve at a specified point	Homework, quizzes, and tests
Students will determine limits of functions	Homework, quizzes, and tests

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

Stewart. *Calculus* (current edition). Belmont, CA: Brooks/Cole, Cengage Learning.

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 (Technology Center 101; phone 636-481-3169).

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).

XI.   ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

XII.   OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class

meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.