MATH-1480: MODERN MATHEMATICS FOR BUSINESS AND SOCIAL SCIENCES II

Cuyahoga Community College

Viewing: MATH-1480 : Modern Mathematics for Business and Social Sciences II

Board of Trustees:
September 2019

Academic Term:
Fall 2019

Subject Code
MATH - Mathematics

Course Number:
1480

Title:
Modern Mathematics for Business and Social Sciences II

Catalog Description:
Second of a two-semester sequence. Topics include the fundamentals of differential and integral calculus, with applications in business and social sciences.

Credit Hour(s):
4

Lecture Hour(s):
4

Lab Hour(s):
0

Other Hour(s):
0

Requisites
Prerequisite and Corequisite
MATH-1470 Modern Mathematics for Business and Social Sciences I, or departmental approval: equivalent coursework.

I. ACADEMIC CREDIT

Academic Credit According to the Ohio Department of Higher Education, one (1) semester hour of college credit will be awarded for each lecture hour. Students will be expected to work on out-of-class assignments on a regular basis which, over the length of the course, would normally average two hours of out-of-class study for each hour of formal class activity. For laboratory hours, one (1) credit shall be awarded for a minimum of three laboratory hours in a standard week for which little or no out-of-class study is required since three hours will be in the lab (i.e. Laboratory 03 hours). Whereas, one (1) credit shall be awarded for a minimum of two laboratory hours in a standard week, if supplemented by out-of-class assignments which would normally average one hour of out-of-class study preparing for or following up the laboratory experience (i.e. Laboratory 02 hours). Credit is also awarded for other hours such as directed practice, practicum, cooperative work experience, and field experience. The number of hours required to receive credit is listed under Other Hours on the syllabus. The number of credit hours for lecture, lab and other hours are listed at the beginning of the syllabus. Make sure you can prioritize your time accordingly. Proper planning, prioritization and dedication will enhance your success in this course.

The standard expectation for an online course is that you will spend 3 hours per week for each credit hour.

II. ACCESSIBILITY STATEMENT

If you need any special course adaptations or accommodations because of a documented disability, please notify your instructor within a reasonable length of time, preferably the first week of the term with formal notice of that need (i.e. an official letter from the Student Accessibility Services (SAS) office). Accommodations will not be made retroactively.
For specific information pertaining to ADA accommodation, please contact your campus SAS office or visit online at http://www.tri-c.edu/accessprograms. Blackboard accessibility information is available at http://access.blackboard.com.

III. ATTENDANCE TRACKING

Regular class attendance is expected. Tri-C is required by law to verify the enrollment of students who participate in federal Title IV student aid programs and/or who receive educational benefits through other funding sources. Eligibility for federal student financial aid is based in part on enrollment status.

Students who do not attend classes for the entire term are required to withdraw from the course(s). Additionally, students who withdraw from a course or stop attending class without officially withdrawing may be required to return all or a portion of their financial aid based on the date of last attendance. Students who do not attend the full session are responsible for withdrawing from the course(s).

Tri-C is responsible for identifying students who have not attended a course before financial aid funds can be applied to students’ accounts.

Therefore, attendance is recorded in the following ways:

• For in-person and blended-learning courses, students are required to attend the course by the 15th day of the semester (or equivalent for terms shorter than five weeks) to be considered attending. Students who have not met all attendance requirements for in-person and blended courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

• For online courses, students are required to login at least two times per week and submit one assignment per week for the first two weeks of the semester, or equivalent to the 15th day of the term. Students who have not met all attendance requirements for online courses, as described herein, within the first two weeks or equivalent, will be considered not attending.

At the conclusion of the first two weeks of a semester or equivalent, instructors report any registered students who have "Never Attended" a course. Those students will be administratively withdrawn from that course. However, after the time period in the previous paragraphs, if a student stops attending a class or wants or needs to withdraw, for any reason, it is the student's responsibility to take action to withdraw from the course. Students must complete and submit the appropriate Tri-C form by the established withdrawal deadline.

Tri-C is required to ensure that students receive financial aid only for courses that they attend and complete. Students reported for not attending at least one of their registered courses will have all financial aid funds held until confirmation of attendance in registered courses has been verified. Students who fail to complete at least one course may be required to repay all or a portion of their federal financial aid funds and may be ineligible to receive future federal financial aid awards. Students who withdraw from classes prior to completing more than 60 percent of their enrolled class time may be subject to the required federal refund policy.

If illness or emergency should necessitate a brief absence from class, students should confer with instructors upon their return. Students having problems with coursework due to a prolonged absence should confer with the instructor or a counselor.

IV. LEARNING OUTCOMES ASSESSMENT

Occasionally, in addition to submitting assignments to their instructors for evaluation and a grade, students will also be asked to submit completed assignments, called ‘artifacts,’ for assessment of course and program outcomes and the College’s Essential Learning Outcomes (ELOs). The artifacts will be submitted in Blackboard or a similar technology. The level of mastery of the outcome demonstrated by the artifact DOES NOT affect the student’s grade or academic record in any way. However, some instructors require that students submit their artifact before receiving their final grade. Some artifacts will be randomly selected for assessment, which will help determine improvements and support needed to further student success. If you have any questions, please feel free to speak with your instructor or contact the Learning Outcomes Assessment office.

V. CONCEALED CARRY STATEMENT

College policy prohibits the possession of weapons on college property by students, faculty and staff, unless specifically approved in advance as a job-related requirement (i.e., Tri-C campus police officers) or, in accordance with Ohio law, secured in a parked vehicle in a designated parking area only by an individual in possession of a valid conceal carry permit.

As a Tri-C student, your behavior on campus must comply with the student code of conduct which is available on page 29 within the Tri-C student handbook, available at http://www.tri-c.edu/student-resources/documents/studenthandbook.pdf. You must also comply with the College’s Zero Tolerance for Violence on College Property available at http://www.tri-c.edu/policies-and-procedures/documents/3354-1-20-10-zero-tolerance-for-violence-policy.pdf

Outcomes

Course Outcome(s):
Evaluate, interpret, and apply limits of various functions.
Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Define and utilize limits and their properties.
2. Evaluate limits algebraically and graphically.
3. Determine one-sided and two-sided limits.
4. Evaluate limits involving infinity.
5. Compute and apply average rate of change.
6. Compute and apply instantaneous rate of change.
7. Determine the slope and equation of a tangent line.
8. Find the derivative of a function using the limit definition of the derivative.

Course Outcome(s):
Utilize several techniques to compute derivatives of functions.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Identify various notations for the derivative.
2. Utilize basic rules (constant, power, constant-multiple, sum/difference) for derivatives.
3. Utilize the Product Rule and Quotient Rule for derivatives.
4. Apply derivatives to marginal analysis.
5. Compute and interpret average cost and marginal average cost.
6. Evaluate and analyze a composition of functions.
8. Compute derivatives of exponential and logarithmic functions.
9. Define and utilize the conditions of continuity.
10. Demonstrate the link between continuity and differentiability.

Course Outcome(s):
Analyze and apply derivatives to graph and optimize functions.

Essential Learning Outcome Mapping:
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

Objective(s):
1. Define, compute, and utilize the critical numbers of a function.
2. Determine where a function is increasing and decreasing using derivatives.
3. Find and interpret local (relative) extrema for a function.
4. Perform and interpret the First Derivative Test for a function.
5. Find the second derivative and higher derivatives.
6. Identify various notations for the second derivative and higher derivatives.
7. Define and determine the concavity of a function and inflection points.
8. Perform and interpret the Second Derivative Test for a function.
10. Define and utilize the Extreme Value Theorem.
11. Define and utilize the Critical Point Theorem.
12. Apply derivatives to solve optimization problems.
13. Sketch the graph of a function, including information found with the first and second derivatives.

**Course Outcome(s):**
Utilize several techniques to compute and apply definite and indefinite integrals.

**Essential Learning Outcome Mapping:**
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**
1. Define and find antiderivatives of functions.
2. Define, identify notation for, and determine indefinite integrals.
3. Utilize basic rules (power, constant-multiple, sum/difference) for integrals.
4. Compute integrals of exponential functions and 1/x.
5. Perform integration by substitution.
6. Perform integration by parts.
7. Compute the approximate area under a curve using rectangles.
8. Define, identify notation for, and determine definite integrals.
9. Compute the area under a curve using definite integrals.
10. Define and apply The Fundamental Theorem of Calculus.
11. Utilize properties of definite integrals.
12. Compute the area between two curves using definite integrals.
13. Apply definite integrals to compute future value and present value of an investment with interest compounded continuously.
14. Apply definite integrals to compute consumers’ and producers’ surplus.

**Course Outcome(s):**
Evaluate and compute the derivative of functions involving multiple variables.

**Essential Learning Outcome Mapping:**
Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Quantitative Reasoning: Analyze problems, including real-world scenarios, through the application of mathematical and numerical concepts and skills, including the interpretation of data, tables, charts, or graphs.

**Objective(s):**
1. Define, identify notations for, and evaluate functions of several variables.
2. Compute first-order and second-order partial derivatives.

**Methods of Evaluation:**
1. A minimum of three periodic exams.
2. Quizzes.
3. Homework.
4. In class collaborative work.
5. Graphing calculator or computer application problems.
6. Comprehensive final exam.

**Course Content Outline:**
1. Limits and the definition of the derivative
   a. Properties of limits
   b. Evaluating limits algebraically and graphically
   c. One-sided and two-sided limits
   d. Limits involving infinity
   e. Average rate of change
f. Instantaneous rate of change
g. Slope and equation of a tangent line
h. Limit definition of the derivative

2. Techniques for finding derivatives
   a. Notations for the derivative
   b. Basic rules (constant, power, constant-multiple, sum/difference) for derivatives
   c. Product Rule and Quotient Rule
   d. Marginal analysis
   e. Average cost and marginal average cost
   f. Composition of functions
   g. The Chain Rule and the Generalized Power Rule
   h. Derivatives of exponential and logarithmic functions
   i. Conditions of continuity
   j. Continuity and differentiability

3. Applications of derivatives
   a. Critical numbers
   b. Increasing and decreasing functions
   c. Local extrema
   d. First Derivative Test
   e. The second derivative and higher derivatives
   f. Notations for the second derivative and higher derivatives
   g. Concavity and inflection points
   h. Second Derivative Test
   i. Absolute extrema
   j. Extreme Value Theorem
   k. Critical Point Theorem
   l. Optimization applications
   m. Curve sketching

4. Integration
   a. Antiderivatives
   b. The indefinite integral
   c. Basic rules (power, constant-multiple, sum/difference) for integrals
   d. Integration of exponential functions and 1/x
   e. Integration by substitution
   f. Integration by parts
   g. Approximate area under a curve using rectangles
   h. The definite integral
   i. Area under a curve
   j. The Fundamental Theorem of Calculus
   k. Properties of definite integrals
   l. Area between two curves
   m. Present value and future value with interest compounded continuously
   n. Consumers’ and producers’ surplus

5. Multivariate calculus
   a. Functions of several variables
   b. First-order and second-order partial derivatives

Resources


