



Calculus I – MATH 2413.051 (Dual Credit)

Course Syllabus: Spring 2020

“Northeast Texas Community College exists to provide personal, dynamic learning experiences empowering students to succeed.”

Instructor: Michael Miller

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Office Hours	Monday	Tuesday	Wednesday	Thursday	Friday	Online
	7:35-8:00 3:20-3:45	7:35-8:00 3:20-3:45	7:35-8:00 3:20-3:45	7:35-8:00 3:20-3:45	7:35-8:00	Available via email

This syllabus serves as the documentation for all course policies and requirements, assignments, and instructor/student responsibilities.

Information relative to the delivery of the content contained in this syllabus is subject to change. Should that happen, the student will be notified.

Course Description:

Four credit hours. Calculus I is a standard first course in the calculus. Topics include differentiation of algebraic and trigonometric functions, differentiation formulas, applications of the derivative, mean value theorem, maxima/minima, point of inflection, curve sketching, antiderivatives, definite and indefinite integrals, upper and lower sums, and the fundamental theorem.

Prerequisite(s): MATH 2412 or equivalent with a grade of “C” or better

Student Learning Outcomes:

Upon successful completion of this course, students will

2413.1 Determine the limit of a function graphically, numerically, and analytically.

2413.2 Calculate derivatives using the definition of the derivative as the limit of a difference quotient.

2413.3 Calculate derivatives of algebraic, trigonometric, and implicit functions.

2413.4 Apply methods of calculus to graph polynomial, rational, and trigonometric functions.

2413.5 Problem-solve a broad base of application problems involving differentiation including but not limited to Rolle’s Theorem and the Mean Value Theorem.

2413.6 Calculate and apply antiderivatives of algebraic and trigonometric functions.

2413.7 Understand the relationship between antiderivative and integral by way of the Fundamental Theorem of Calculus.

Core Curriculum Purpose and Objectives:

Through the core curriculum, students will gain a foundation of knowledge of human cultures and the physical and natural world; develop principles of personal and social responsibility for living in a diverse world; and advance intellectual and practical skills that are essential for all learning.

Courses in the foundation area of mathematics focus on quantitative literacy in logic, patterns, and relationships. In addition, these courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience.

College Student Learning Outcomes:

Critical Thinking Skills

CT.1 Students will demonstrate the ability to 1) analyze complex issues, 2) synthesize information, and 3) evaluate the logic, validity, and relevance of data.

Communication Skills

CS.1 Students will effectively develop, interpret and express ideas through written communication.

Empirical and Quantitative Skills

EQS.1 Students will manipulate numerical data or observable facts by organizing and converting relevant information into mathematical or empirical form

EQS.2 Students will analyze numerical data or observable facts by processing information with correct calculations, explicit notations, and appropriate technology.

EQS.3 Students will draw informed conclusions from numerical data or observable facts that are accurate, complete, and relevant to the investigation.

Evaluation/Grading Policy:

4 Major Exams	50%
Homework / Quiz Grade	20%
4 Maple Assignments	10%
Comprehensive Final Exam	20%
TOTAL	100%

Grading System

"A"	90-100%
"B"	80-89%
"C"	70-79%
"D"	60-69%
"F"	< 60%

Graded assignments will be returned no later than three days following the assignment due date. For due dates, refer to the tentative class schedule below.

Required Instructional Materials:

Larson/Edwards, Calculus, 11th Edition, 2018
Loose-leaf textbook with WebAssign access code

Publisher: Brooks/Cole, Belmont, CA

ISBN Number-13: 978-133-760-4741 (Loose-leaf textbook with WebAssign access code)

Note: The NTCC Bookstore link is at www.ntcc.edu

Optional Instructional Materials:

Change and Motion: Calculus Made Clear, 2nd Edition; Dr. Michael Starbird, The University of Texas at Austin (24, 30 min. lectures >> available through Mr. Miller or the WHS Library).

Minimum Technology Requirements: Computer with internet access and a graphing calculator. A graphing calculator is required (TI-84 plus CE is preferred, but other models may be approved by the instructor).

Required Computer Literacy Skills: A working knowledge of Microsoft Windows and/or Mac OS, as well as a familiarity with online learning platforms such as WebAssign.

- 1) Communicate via email;
- 2) Saving and reloading saved files;
- 3) Navigate Blackboard to access posted materials and WebAssign assignments.

Course Structure and Overview: There will be in-class lectures for each section. It is recommended that the student read and work through the examples in the section prior to the lecture. Notes for each lecture will be posted on Blackboard as well as Google Classroom.

Homework assignments will consist of exercises from the textbook as well as online assignments in WebAssign.

There are 4 Exams, 4 Maple Projects (more information will be provided in class, each project should require no more than three hours outside of class), Quizzes will be given at the instructors discretion (scheduling of quizzes will be based on overall student performance in class and homework assignments), the class will end with a Comprehensive Final Exam.

Communications: Questions can be directed to the instructor in class, during office hours, or via email (mike.miller@winnsboroisd.org or mmiller@ntcc.edu). Emails will be answered within 24 hours. A Remind 101 account will be setup for the class and used if it becomes necessary to notify students of changes in assignment due dates, lecture schedule, school closings, etc.

The college's official means of communication is via your campus email address. I will use your campus email and Blackboard to communicate with you outside of class. Make sure you keep your campus email cleaned out and below the limit so you can receive important messages.

Institutional/Course Policy: Regular and punctual attendance at all scheduled classes is expected. Attendance is necessary for successful completion of course work.

Due dates for the WebAssign assignments have been posted in WebAssign and students must keep up with these dates in an online setting.

Cell phones must be silenced and placed out of sight during class lectures.

No late work will be accepted.

Make-up exams will not be given unless the arrangements have been made prior to the exam.

NTCC Academic Honesty/Ethics Statement:

NTCC upholds the highest standards of academic integrity. The college expects all students to engage in their academic pursuits in an honest manner that is beyond reproach using their intellect and resources designated as allowable by the course instructor. Students are responsible for addressing questions about allowable resources with the course instructor. Academic dishonesty such as cheating, plagiarism, and collusion is unacceptable and may result in disciplinary action. This course will follow the NTCC Academic Honesty and Academic Ethics policies stated in the Student Handbook. Refer to the student handbook for more information.

ADA Statement:

It is the policy of NTCC to provide reasonable accommodations for qualified individuals who are students with disabilities. This College will adhere to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations as required to afford equal educational opportunity. It is the student's responsibility to request accommodations. An appointment can be made with the Academic Advisor/Coordinator of Special Populations located in Student Services and can be reached at 903-434-8264. For more information and to obtain a copy of the Request for Accommodations, please refer to special population page on the NTCC website.

Family Educational Rights and Privacy Act (FERPA):

The Family Educational Rights and Privacy Act (FERPA) is a federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. FERPA gives parents certain rights with respect to their children's educational records. These rights transfer to the student when he or she attends a school beyond the high school level. Students to whom the rights have transferred are considered "eligible students." In essence, a parent has no legal right to obtain information concerning the child's college records without the written consent of the student. In compliance with FERPA, information classified as "directory information" may be released to the general public without the written consent of the student unless the student makes a request in writing. Directory information is defined as: the student's name, permanent address and/or local address, telephone listing, dates of attendance, most recent previous education institution attended, other information including major, field of study, degrees, awards received, and participation in officially recognized activities/sports.

Tentative Course Timeline (*note* instructor reserves the right to make adjustments to this timeline at any point in the term):

Limits and Their Properties (Ch. 1)

1/8-10

1. A Preview of Calculus (Ch. 1.1)

Objectives:

- Understand what calculus is and how it compares with precalculus.
- Understand that the tangent line and area problems are basic to calculus.

Assignment: Pg. 51 >> 1-11 all

1/13-17

2. Finding Limits Graphically and Numerically (Ch. 1.2)

Objectives:

- Estimate a limit using a numerical or graphical approach.
- Learn different ways that a limit can fail to exist.
- Study and use a formal definition of limit.

Assignment: Pg. 59-62 >> 1-19 odd, 21-28, 30, 32, 34, 40, 42, 48, 52, (63-66 W), 68, 72, (73-76 TF), (80 GR)

1/21-24

3. Evaluating Limits Analytically (Ch. 1.3)

Objectives:

- Evaluate a limit using properties of limits.
- Develop and use a strategy for finding limits.
- Evaluate a limit using dividing out and rationalizing techniques.
- Evaluate a limit using the Squeeze Theorem.

Assignment: Pg. 71-73 >> 1-73 odd, 77, (93, 95 odd GR), (97, 98 W), 100-104 (115-120 TF), (121 Proof), (123 GR)

1/27-29

4. Continuity and One-Sided Limits (Ch. 1.4)

Objectives:

- Determine continuity at a point and continuity on an open interval.
- Determine one-sided limits and continuity on a closed interval.
- Use properties of continuity.
- Understand and use the Intermediate Value Theorem.

Assignment: Pg. 83-86 >> 1-57 odd, 61-69 odd, 72, 76-82 even, (83, 85, 88 W), (101, 102, 104 W), (105-110 TF), 112, 123, (126 Proof)

1/30-31

5. Infinite Limits (Ch. 1.5)

Objectives:

- Determine infinite limits from the left and from the right.
- Find and sketch the vertical asymptotes of the graph of a function.

Assignment: Pg. 92-94 >> 1-51 odd, 54, (55-57 W), 58-62, (65-68 TF)

6. Section Project: Graphs and Limits of Trigonometric Functions (Pg. 94)

Differentiation (Ch. 2)

2/3-7

1. The Derivative and the Tangent Line Problem (Ch. 2.1)

Objectives:

- Find the slope of the tangent line to a curve at a point.
- Use the limit definition to find the derivative of a function.
- Understand the relationship between differentiability and continuity.

Assignment: Pg. 107-109 >> 1-27 odd, (29-35 GR), 37-41 odd, (43-48 W) 50, 53, 54, 56, 58, 62, 64, 70, 71, 73, 77-80, (93-96 TF)

2/10, 11

2. Basic Differentiation Rules and Rates of Change (Ch. 2.2)

Objectives:

- Find the derivative of a function using the Constant Rule.
- Find the derivative of a function using the Power Rule.
- Find the derivative of a function using the Constant Multiple Rule.
- Find the derivative of a function using the Sum and Difference Rules.
- Find the derivatives of the sine function and of the cosine function.
- Use derivatives to find rates of change.

Assignment: Pg. 118-121 >> 1-25 odd, 31-68 odd, 70, (69-74 W), 76, 83, (85-90 TF), 93-109 odd, (114 Proof)

2/12-14

3. Product and Quotient Rules and Higher-Order Derivatives (Ch. 2.3)

Objectives:

- Find the derivative of a function using the Product Rule.
- Find the derivative of a function using the Quotient Rule.
- Find the derivative of a trigonometric function.
- Find a higher-order derivative of a function.

Assignment: Pg. 129-132 >> 1-55 odd, 58, 59-79 odd, 81-86, (87 Proof), (89 MD), 90, 91, 93, 97, (110 W), 111-114, 115, 118, (131-136 TF), 137

2/20, 21

4. TEST I (Ch. 1.1-2.3 – two parts, calculator and no calculator)

Differentiation (Ch. 2) – cont.

2/24-26

1. The Chain Rule (Ch. 2.4)

Objectives:

- Find the derivative of a composite function using the Chain Rule.
- Find the derivative of a function using the General Power Rule.
- Simplify the derivative of a function using algebra.
- Find the derivative of a trigonometric function using the Chain Rule.

Assignment: Pg. 140-143 >> 9-53 odd, 58, 63-79 odd, 82, 85, (93, 94 W), 100, 102, 103, 108, 112, (121-124 TF)

2/27, 28

2. Implicit Differentiation (Ch. 2.5)

Objectives:

- Distinguish between functions written in implicit form and explicit form.
- Use implicit differentiation to find the derivative of a function.

Assignment: Pg. 149-151 >> 1-19 odd, 25-43 odd, 47, 50, 54, 63, (70 W)

3/2-6

3. Related Rates (Ch. 2.6)

Objectives:

- Find a related rate.
- Use related rates to solve real-life problems.

Assignment: Pg. 157-160 >> 4, 6, 11-35 odd, 41, 43, 46, (47 MD), 48

Application of Derivatives (Ch. 3)

3/9, 10

1. Extrema on an Interval (Ch. 3.1)

Objectives:

- Understand the definition of extrema of a function on an interval.
- Understand the definition of relative extrema of a function on an open interval.
- Find extrema on a closed interval.

Assignment: Pg. 171-173 >> 1-43, 50, (55-56 W), 57, 61, (65-68 TF)

3/11-13

2. Rolle's Theorem and the Mean Value Theorem (Ch. 3.2)

Objectives:

- Understand and use Rolle's Theorem.
- Understand and use the Mean Value Theorem.

Assignment: Pg. 178-180 >> 1, 3, 9-23 odd, 27, 34, 35, 46, 49, 56, 61, (64 W), (73-76 TF)

3/23-25

3. Increasing and Decreasing Functions and the First Derivative Test (Ch. 3.3)

Objectives:

- Determine intervals on which a function is increasing or decreasing.
- Apply the First Derivative Test to find relative extrema of a function.

Assignment: Pg. 187-190 >> 1-47 odd, 57-69 odd, 70, (78 NGAA), 79, 81, 85, (91-96 TF)

3/26, 27

4. Concavity and the Second Derivative Test (Ch. 3.4)

Objectives:

- Determine intervals on which a function is concave upward or concave downward.
- Find any points of inflection of the graph of a function.
- Apply the Second Derivative Test to find relative extrema of a function.

Assignment: Pg. 196-198 >> 1-43 eoo, 51, 52, 56, 58, 61, 65, (75-78 TF)

3/30, 31

5. Limits at Infinity (Ch. 3.5)

Objectives:

- Determine (finite) limits at infinity.
- Determine the horizontal asymptotes, if any, of the graph of a function.
- Determine infinite limits at infinity.

Assignment: Pg. 206-208 >> 5-10, 19-37 odd, (49 NGAA), 51, 52, (53 W), 56, 58

4/2, 3

6. TEST II (2.4-6, 3.1-5 – two parts, calculator and no calculator)

Application of Derivatives (Ch. 3) – cont.

4/6-9

1. Sketching Curves (Ch. 3.6)

Objective:

- Analyze and sketch the graph of a function.

Assignment: Pg. 215-218 >> 1-7 odd, 9-35 odd, 29, 45, 47, 49, 51-56, (63, 64 W), 65, 78

4/14

2. TEST III (3.6 – no calculator)

Application of Derivatives (Ch. 3) – cont.

4/15-17

1. Optimization (applied maximum and minimum problems) (Ch. 3.7)

Objective:

- Solve applied minimum and maximum problems.

Assignment: Pg. 224-228 >> 3-9 odd, 17-39 odd, 43, (46 NGAA), 48, 49

4/20-22

2. Differentials (Ch. 3.9)

Objectives:

- Understand the concept of a tangent line approximation.
- Compare the value of the differential, dy , with the actual change in y , Δy .
- Estimate a propagated error using a differential.
- Find the differential of a function using differentiation formulas.

Assignment: Pg. 240-241 >> 25-39 odd, 40, 41, (47 W), (49-53 TF)

Integration (Ch. 4)

4/23, 24

1. Antiderivatives and Indefinite Integration (Ch. 4.1)

Objectives:

- Write the general solution of a differential equation.
- Use indefinite integral notation for antiderivatives.
- Use basic integration rules to find antiderivatives.
- Find a particular solution of a differential equation.

Assignment: Pg. 255-257 >> 11-35 odd, 41, 43, 49-51, 53-59 odd, 65, 67, (73-78 TF)

4/27, 28

2. Area (sigma notation and evaluating sums) (Ch. 4.2)

Objectives:

- Use sigma notation to write and evaluate a sum.
- Understand the concept of area.
- Approximate the area of a plane region.
- Find the area of a plane region using limits.

Assignment: Pg. 267-269 >> 1-53 odd, (73, 74 TF)

4/29-5/1

3. Riemann Sums and Definite Integrals (Ch. 4.3)

Objectives:

- Understand the definition of a Riemann sum.
- Evaluate a definite integral using limits.
- Evaluate a definite integral using properties of definite integrals.

Assignment: Pg. 277-280 >> 1-43 odd, 47, 50, (63-68 TF)

5/4-6

4. The Fundamental Theorem of Calculus (Ch. 4.4)

Objectives:

- Evaluate a definite integral using the Fundamental Theorem of Calculus.
- Understand and use the Mean Value Theorem for Integrals.
- Find the average value of a function over a closed interval.
- Understand and use the Second Fundamental Theorem of Calculus.

Assignment: Pg. 292-295 >> 1, (5, 7 GR), 9-51 odd, 53, 56, 60, 62, 65, 69, 71, 81-91 odd, 95-103 odd, (109, 110 TF)

5. Section Project: Demonstrating the Fundamental Theorem (Pg. 296)

5/7, 8

6. TEST IV (3.7-9, 4.1-4 – two parts, calculator and no calculator)

5/11

COMPREHENSIVE FINAL EXAM

- 3 hours (4:00-7:00 PM), WHS, rm. 11
- Ch. 1.1-4.4