

# UNC

UNIVERSITY OF NORTHERN COLORADO

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## Extended Campus

College of Natural & Health Sciences  
School of Mathematical Sciences



UNC Dual Enrollment at Valley High School

MATH 131-660: Calculus I  
Fall 2019 & Spring 2020

INSTRUCTOR: Ms. Beth Sasse  
ROOM: 139  
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### AVAILABILITY FOR HELP:

- **You can and will succeed in this course IF YOU ASK FOR HELP WHEN YOU NEED IT!**
- I am available to help you at the following times:
  - Most days before school from 7:15-8:00 (please let me know if you plan to come in during these times).
  - Most days after school from 3:30-4:00 (please let me know if you plan to come in during these times).
  - *If you need help outside of the times listed above, please make arrangements with me ahead of time.*

### COURSE DESCRIPTION:

- NOTE: This is a Dual-Enrollment course offered with University of Northern Colorado. As such, you are expected to meet all of the requirements and expectations set forth by the mathematics department at University of Northern Colorado
- **MATH 131: Calculus I**, 4 credits
  - First course in a three-course sequence in calculus. Differentiation and related concepts, applications of derivatives, including exponential, logarithmic and trigonometric functions. (LAC, gtP)
- **Prerequisite for UNC Dual Enrollment**
  - Junior or Senior status
  - 3.0 cumulative GPA
  - Grade of “C” or better in Plane Trigonometry. A grade of “C-” is not acceptable.
  - Counselor/Instructor approval prior to taking the course
  - Parent consent
  - Special Exemptions to these qualifications may be made on an individual basis through written request to UNC Extended Campus

## COURSE OBJECTIVES:

The course is also designed to satisfy the criteria for inclusion into the UNC Liberal Arts Core Area 2: Mathematics. Students successfully completing the course will enhance their competency in mathematics and their competency in critical thinking. In particular, students successfully completing the course will know how to:

- Recognize properties of functions and their inverses.
- Use properties of functions; including, but not limited to: polynomial, rational, exponential, logarithmic, and trigonometric functions.
- Sketch graphs of functions using the first and second derivative.
- Determine limits of simple expressions.
- Apply the procedures of differentiations accurately.
- Apply the differentiation procedures to solve related rates and extreme value problems.
- Perform accurately definite and indefinite integration.
- Apply the integration procedures to solve area and volume problems, as well as other applied problems.

## OUTLINE OF COURSE CONTENT (MAJOR STUDY UNITS):

- Functions, precalculus, limits, and continuity
  - Functions, domain and range, rates of change, the difference quotient
  - Linear, exponential, power, polynomial, rational, trigonometric, and logarithmic functions
  - Operations on functions
  - Inverses of functions
  - Limits
  - Continuity and the Intermediate Value Theorem
- The meaning of the derivative
  - Position and velocity, slopes of tangent lines
  - Formal limit definition of the derivative at a point
  - The derivative as a function
  - Interpreting the meaning of the derivative function in context
  - Second derivatives and concavity
  - Differentiability and non-differentiability
- Derivative shortcut rules
  - Constant multiple rule, sum and difference rule, power rule, derivatives of polynomials
  - Exponential function rule, trigonometric function rules
  - Product and quotient rules
  - Chain rule
  - Inverse functions: logarithmic function rule, inverse trigonometric function rules
  - (Optional) Implicit functions; hyperbolic functions
- Using the derivative
  - Linear approximation
  - Critical points and local extrema; global extrema
  - Curve-sketching with calculus; inflection points
  - Modeling, optimization, and related rates in real-world contexts
  - L'Hopital's rule
- The definite integral
  - The area problem; recovering distance traveled from velocity
  - Riemann sums and the Riemann integral
  - The (First) Fundamental Theorem of Calculus; net change theorem; interpretations
  - Properties of the definite integral; symmetry; area between curves; mean value theorem for integrals
- The indefinite integral as an antiderivative

- Antiderivatives graphically, numerically, analytically
- Differential equations; equations of motion
- Second Fundamental Theorem of Calculus; existence of antiderivatives

#### TEXTBOOK:

- *Calculus: Graphical, Numerical, Algebraic*: Finney, Demana, Waits, Kennedy, Bressoud (5<sup>th</sup> Edition, 2016)
  - Replacement Cost: \$125

#### PRIMARY METHODS OF INSTRUCTION:

- Cooperative learning
- Discovery
- Investigation
- Self-Study
- Lecture

#### MATERIALS:

- Paper for completing assignments (both in-class assignments, and homework assignments)
- Pencil or pen (blue or black only) and highlighter
- Graphing Calculator
  - Acceptable models include: TI-83, TI-83+, TI-84, TI-84+
    - All other models, please ask.
  - Sharing of calculators during quizzes or exams will not be permitted.
  - Bring calculators to class. We will be using them throughout the course.
- Additional recommended materials (not required):
  - Spiral notebook for class notes
  - Folder or binder
  - Graph paper (you can download free graph paper to print by searching on the internet)

#### GRADING:

- The grading scale below will be used for both your VHS grade and your UNC Dual-Enrollment grade:
  - A: 90.0-100%
  - B: 80.0-89.9%
  - C: 70.0-79.9%
  - D: 60.0-69.9%
  - F: 59.5% and below
- Your grade for the course consists of four parts:
  - 10%: Homework and Daily Work
  - 30%: Quizzes
  - 60%: Tests, Projects, and Final Exam

#### HOMEWORK:

- Homework will be assigned on a daily basis and collected at the **beginning of the next class**.
  - **NO LATE** homework is accepted!
- Homework assignments will be worth 10 points each.
  - To get the full 10 points, you must **complete** the assignment on time, follow the format specified below, **show your work**, and highlight your answers.
    - If you do not complete the assignment, you will score between 0 and 9 points, as determined by the teacher.
    - **If you do not attempt any problems on the assignment, you will receive 0 points!**
- **NO CREDIT** will be given for assignments with answers only!
  - If you do not understand a problem, then write a specific question for that problem on your homework page.

- Format for homework assignments:
  - Put a heading in the upper right-hand corner of the paper. This should include your **full name, the date, the period, and the assignment** (page number and problems).
  - Divide your paper in two columns (to fit more on each page).
  - Work the problems vertically down the paper. Put only one step of a problem on each line.
  - Show all of your work and highlight your answers.
- If you are absent, you have **one week from the date of the assignment** to turn in the assignments that you missed.
  - After this time, no credit will be given for make-up homework!

#### QUIZZES:

- You are expected to take quizzes during class time, unless you were absent the class immediately before the quiz.
  - If the quiz does not cover information from the previous class, then students who were absent the previous class are also expected to take the quiz.
- You will turn in your cell phone to the teacher while you are taking a quiz. This includes both quizzes completed during class, as well as quizzes completed at a later time.
  - All cell phones will be kept in a secure location.
  - Cell phones will be returned once ALL students have completed the quiz.
- Once you have a quiz in your hand, you must complete it—you may not return to finish it later.
  - This includes quizzes taken both during class and outside of class time!
- Quizzes will be both announced and unannounced, and will cover small sections of a chapter/unit.
- Students will not be allowed to use notes of any kind during tests, unless otherwise specified.
- If you are absent, you have **two weeks from the date of the quiz** to make up the quiz.
  - Usually, you will be expected to take the test during the next class you are in attendance.
    - You will then be responsible for making up any work during the time that you are taking the test.
  - After this time, any missing test scores become zero.
- There will be **NO** retakes on quizzes, unless otherwise specified.

#### TESTS:

- Tests will be announced at least one week in advance and will cover a chapter or unit.
- Students will not be allowed to use notes of any kind during tests, unless otherwise specified.
- Students are expected to take tests during class time, unless they were absent the class immediately before the test.
- Tests must be completed within the time of class, unless otherwise specified.
- You will turn in your cell phone to the teacher while you are taking a test. This includes both tests completed during class, as well as tests completed at a later time.
  - All cell phones will be kept in a secure location.
  - Cell phones will be returned once ALL students have completed the test.
- Once you have a test in your hand, you must complete it—you may not return to finish it later.
  - This includes tests taken outside of class time!
- If you are absent, you have **two weeks from the date of the test** to make up the test.
  - Usually, you will be expected to take the test during the next class you are in attendance.
    - You will then be responsible for making up any work during the time that you are taking the test.
  - After this time, any missing test scores become zero.
- There will be **NO** retakes or corrections on tests.

## PROJECTS:

- One or more major projects may be assigned each semester.
- Projects must be turned in on OR BEFORE the specified deadline, regardless of absences.
  - Projects are due at the start of class on the specified deadline; anything after this is considered “late.”
  - **Late projects will be docked 10% for each day past the deadline!**
- Each project will be counted equivalent to one test grade.

## FINAL EXAM:

- There will be a cumulative final exam at the end of each semester.
- There are NO retakes, corrections, or exemptions for the final exam.

## MAKE-UP WORK:

- When you miss a class, it is your responsibility to **get notes from the class that you missed**.
  - You may request notes from another student in class.
  - You may request an electronic copy of the notes from me via e-mail (this is available for any day in which we used the computer and projector for class notes).
- It is your responsibility to get make-up work from me (outside of class time) when you are absent.
  - You can request your make-up work in person before/after school.
  - You can request your make-up work via e-mail.
- Timelines for make-up work:
  - You have **one week from the date of the assignment** to make up your homework and class work.
    - After this time, any assignments will be a zero score.
  - You have **two weeks from the date of the assignment** to make up any quizzes or tests.
    - After this time, any assessments will be a zero score.
- **REMEMBER**—*it is your responsibility to check if you have missed tests or quizzes!*

## PROGRESS REPORTS:

- I will update your grades in the computer at least once a week.
- There are several ways that you **or your parents** can check your progress—school website, ask me, get a print-out.
- **It is your responsibility to track your progress in the class!**
  - Do not wait until the end of the semester to worry about your grade—by then it is usually too late!

## TARDIES:

- Students who do not enter class **before** the bell are considered tardy and must sign the notebook on the back table.
- Consequences for tardiness:
  - First and second tardy: warning.
  - Third and fourth tardy: 2-minute detention after class.
  - Fifth and sixth tardy: 15-minute detention during lunch or before/after school.
  - For students who demonstrate habitual tardiness, administrative action may be taken.

## HALL PASSES:

- You will start each semester with 5 chances to use the hall pass—use them wisely because this is all you get!
- You must have your student ID in order to use the hall pass.
- When you use the pass, you should be gone no more than 5 minutes.
- When you leave the room, be sure to sign out in the notebook. Also, mark the time you return.

- You may not use the pass during the first 5 minutes or last 5 minutes of class—**don't ask!**

#### LEAVING THE ROOM:

- You should sign out if you are using the hall pass, receive a pass during class, are going to a sporting event, and so on—ANYTIME you leave the room!
- Please write your name, the time you leave, where you are going, and the time you come back.
  - If applicable, leave your pass in the notebook.

#### IN THE CLASSROOM:

- You are expected to attend class every day, unless you are sick or have extenuating circumstances.
  - *Remember, it is often extremely difficult to learn the material if you are not in class!*
- The Valley High School Dress code will be strictly enforced!
- Laptops are to enhance your learning during school time, not to entertain you.
  - In this class, they should only be out if I have instructed you to get them out.
  - When using your laptop, stay on task. You should only have open the programs/websites we are using in class!
- In accordance with school policy, cell phones, pagers, headphones and the like may NOT be used while in class!
  - These items must be out of sight AND silent at all times, or they will be confiscated.
  - Calculators on cell phones or similar electronic devices are not appropriate for the classroom.
- You may bring **water** to class as long as it does not interfere with learning and everyone cleans up after himself or herself.
  - Remember, this is a privilege that can be revoked!
- **NO FOOD** (including candy and gum) is allowed in the classroom.

#### BEHAVIOR GUIDELINES AND RESPONSIBILITIES:

- It is my responsibility to teach you, and provide you with the best atmosphere in which to learn. The following guidelines will help us all to make this happen:
  - The rules and guidelines of the school are the governing rules in this classroom. No exceptions.
  - It is your responsibility to come to class **prepared** and **ready to learn** every day!
    - This means you need to **bring all of your materials** with you every day, have any **homework** completed, and be **ready to work and pay attention.**
  - You may talk quietly during work times.
    - At any other time—during lecture, a quiz, a test, a presentation, warm-ups, and so on—talking will not be tolerated and will be addressed as disruptive behavior.
  - Disruptive behavior will not be tolerated!
  - Respect one another. This means no name-calling, harassment, etc.
  - Profanity, in words or action, will not be tolerated AT ALL.
  - Keep the classroom clean.
- **School is a lot of work!** Your success in this class is largely up to you! If you do your work, you will succeed. If you choose not to work, you alone are responsible for the grade that you **earn!**

#### STUDENTS WITH DISABILITIES:

- Any student requesting disability accommodation for this class must inform the instructor and give appropriate notice. Students are encouraged to contact Disability Support Services at Valley High School to certify documentation of disability and to ensure appropriate accommodations are implemented in a timely manner.

## ADDITIONAL INFORMATION FOR UNC DUAL-ENROLLMENT COURSE

### HONOR CODE:

- All members of the University of Northern Colorado community are entrusted with the responsibility to uphold and promote five fundamental values: Honesty, Trust, Respect, Fairness, and Responsibility. These core elements foster an atmosphere, inside and outside of the classroom, which serves as a foundation and guides the UNC community's academic, professional, and personal growth. Endorsement of these core elements by students, faculty, staff, administration, and trustees strengthens the integrity and value of our academic climate.

### ACADEMIC CONDUCT (UNC'S POLICIES):

- UNC's policies and recommendations for academic misconduct will be followed. For additional information, please see the Dean of Student's website, Student Handbook link <http://www.unco.edu/dos/pdf/StudentCodeofConduct.pdf>
- Off-campus students taking courses from UNC, should familiarize themselves with the academic regulations and procedures contained in the current UNC catalog: <http://catalog.unco.edu>.

**DROPPING OR WITHDRAWING FROM A COURSE:** Note: Drop and withdrawal dates for the courses at your school can be found on your [dual enrollment page for your high school](#).

Please use the [Dual Enrollment Drop & Withdrawal Form](#).

- You can drop your course up until the designated Drop Deadline. The course will be removed from your transcript and you will receive a full tuition refund.
- After the Drop Deadline and up until the Withdrawal Deadline you can withdraw from your course. The course will remain on your transcript with a grade of "W" (this does not impact your GPA), and there is no tuition refund.
- After the withdrawal deadline you are unable to be removed from the course. The course will remain on your transcript with the grade that you have earned, and there is no tuition refund.
- If you stop attending the course but fail to officially withdraw from the course(s), you will be responsible for full tuition and fees and the course grade will remain on your transcript.

### **\*Liberal Arts Core & Colorado gtPathways**

This course satisfies 4 credits of Area 2. (Mathematics) of the UNC Liberal Arts Core. This course has been approved by the Colorado Commission on Higher Education for inclusion in the Colorado Guaranteed Transfer Program, gtP. gtP courses automatically transfer to any public institution in Colorado and will continue to count toward general education or other graduation requirements for any liberal arts or science associate or bachelor's degree program IF a grade of C- or higher is recorded. Statewide articulation agreements prescribe specific general education and degree requirements in the following professional degree programs: business, early childhood, elementary education, engineering and nursing. Most other courses not approved for the gtP designation will also be accepted in transfer by other institutions, but may not fulfill general education or degree requirements. For more information on the GT Pathways program, go to <http://higher.colorado.gov/academics/transfers/gtpathways/curriculum.html>.

*Students who successfully complete the Area 2 Liberal Arts Core requirement in mathematics will have developed an understanding of fundamental mathematical concepts and their applications, will have developed their quantitative problem-solving skills, and will have developed a level of quantitative literacy that provides a foundation for success in their programs of study, careers, and citizenship.*

*Specifically, they will be able to:*

- a) Demonstrate good problem-solving habits, including:
  - estimating solutions and recognizing unreasonable results
  - considering a variety of approaches to a given problem, and selecting one that is appropriate
  - interpreting solutions correctly
- b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of

mathematical ideas

- c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style
- d) Apply mathematical concepts, procedures, and techniques appropriate to the course
- e) Recognize and apply patterns or mathematical structure
- f) Utilize and integrate appropriate technology
- g) Demonstrate competency in Quantitative Literacy by being able to:
  - 1) Interpret Information
    - a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
  - 2) Represent Information
    - a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).
  - 3) Perform Calculations
    - a. Solve problems or equations at the appropriate course level.
    - b. Use appropriate mathematical notation.
    - c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.
  - 4) Apply and Analyze Information
    - a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.
    - b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.
    - c. Make judgments based on mathematical analysis appropriate to the course level.
  - 5) Communicate Using Mathematical Forms
    - a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

Students will be assessed on the content and competency criteria through a combination of tests, quizzes and homework assignments.