UNIVERSITY OF NORTHERN COLORADO

Extended Campus

College of Natural & Health Sciences
School of Mathematical Sciences

UNC Dual Enrollment with Windsor High School

Math 132-654: Calculus II (4 credits; gtP*)
Fall 2020 & Spring 2021

Instructor: Shawn Schmalzer
(970) 686-8100 ext. 3671
shawn.schmalzer@weldre4.org
BA, Mathematics, University of Northern Colorado
MA, Mathematics, University of Northern Colorado

Prerequisite:

High school mathematics up to and including Calculus I (with a grade of "C" or better; a C- or lower is not acceptable) **or** college-level Calculus I (grade of "C" or better; a C-or below is not acceptable). Credit allowed for only one of MATH 131 and MATH 171. Student must have a cumulative 3.0 GPA and parental consent.

Catalog Description: Second course in three course sequence in calculus. Integration and applications of integration, sequence and series.

WHS Course Description: Topics covered in this course include, but are not limited to: Integration techniques, infinite series, conics, parametrics, and polar coordinates, vectors and the geometry of space, and vector valued functions.

The Windsor High School course grade is weighted, for example, a grade of A = 5 rather than 4 points as it is calculated in the grade point average. Likewise, a grade of B = 4; C = 3; D = 1.0, F = 0 GPA points.

Students may enroll for four hours of transferable college level credit through the Office of Extended Studies, UNC - at a cost of approximately $260. Registration is to be completed online by the student. Upon receipt of registration, UNC will send billing statements to students' homes and payment must be made to directly to the university. A grade of C or better is required to earn college credit (UNC grades are weighted on the regular 4-point scale; a grade of D or F is NOT transferable and will count against your college GPA).

Calculators: A graphing calculator is required for this course. Instruction is geared toward the TI-84 family. You are required to bring your calculator to class every day.

Text: Calculus of a Single Variable (8th Ed.): Larson, Hostetler, and Edwards. Houghton Mifflin

LEARNING OBJECTIVES: Our course is part of the Mathematics section of UNC's Liberal Arts Core, which means that it is designed to help you enhance your competency in mathematics and critical thinking.

By the end of the course, you will be able to:

- select data and techniques relevant to solving a problem
- interpret and draw inferences from mathematical models, represented as formulas, graphs, or tables
- represent mathematical information symbolically, visually, numerically, and verbally
- use algebraic, geometric, or numerical reasoning to solve problems
- estimate and verify answers to mathematical problems in order to check reasonableness, identify alternatives, and select optimal results
- generalize from specific patterns to abstract principles
- use abstract principles in specific applications
- recognize and identify the limitations of mathematical methods and models
- explain how mathematics applies to your field of interest

In particular, you'll develop calculus skills that will allow you to:

- compute derivatives and integrals of mathematical functions
- use more advanced integration techniques and evaluate improper integrals
- apply integration techniques to find arc length, work, moments, and fluid force
- determine convergence or divergence of series
- perform calculus on parametric and polar systems
- use vector calculus to solve application problems in 3 dimesions
- explain real-world meanings of derivatives and integrals

Course cut percentages for UNC letter grades (average of both semesters at WHS):

A	90.0% or higher
B	80.0 to 89.9
C	70.0 to 79.9
D	60.0 to 69.9
F	Below 60%

Grade breakdown:

Daily work/homework/quizzes	20%
Unit Tests	65%
Semester Final	15%

Course Outline:

***I.* Applications of Integration**

Volume of solids of revolution: the shell method
Arc length and surfaces of revolution and work
Moments, center of mass, fluid pressure and force

***II.* Integration Techniques, Improper Integrals**

Basic integration rules
Integration by parts
Trigonometric integrals and substitution
Partial fractions
L'Hopital's rule revisited
Improper integrals

III. **Infinite Series**

Sequence and series convergence
Integral test and p-series
Comparison of series
Alternating series and ratio roots test
Taylor polynomial
Representing a function with power series
Maclaurin and Taylor series

IV. **Conics, Parametrics, and Polar Coordinates**

Calculus of conics
Parametric equations and calculus
Polar equations and calculus
Area and arc length in polar coordinates
Polar equations of conics and Kepler's Law

V. **Vectors and the Geometry of Space**

Vectors in the plane and in space
Dot product
Cross product
Surfaces in Space
Cylindrical and spherical coordinates

VI. **Vector Valued Functions**

Differentiation and integration of vector valued functions
Velocity and acceleration
Tangent and normal vectors
Arc lengths and curvature

Attendance Expectations

If possible, prearrange absence with me to see what you will miss and gather any materials needed. Since I have teacher notes and video lessons accessible via Canvas, my expectation is you learn the material and come to the following class ready to move on with new material or prepared for any assessment.

Disability Accommodations

Students with Individualized Education Plan will receive accommodations through Windsor High School and will comply with the American Disabilities Act.

WHS Dress Code (page 9-10 of student handbook):

While in school and attending school sponsored events, your appearance should reflect good taste and decency. Clothing that is too revealing, contains references to alcohol or drugs can distract from or interfere with the instructional program or image of Windsor High School

*Students are not permitted to wear hats, bandanas or any other head covering, including having the hood up on a shirt or sweatshirt
*Clothing must cover underwear, midriff, buttocks, lower back, and chest (covered when standing upright). Tank tops, spaghetti straps, or strapless tops are not allowed to be worn in school. Exposed back and low necklines are not acceptable for school.
*Clothing made of see through materials or torn clothing may not expose underwear, midriff, lower back, or chest.
*Short shorts and short skirts are not allowed in school during the school day. Skirts and shorts must be at least mid-thigh length.

*Clothing that displays profanity, gang references, sexual innuendoes, and drug, tobacco, or alcohol references will not be permitted.
*Any jewelry or accessories that could be used as a weapon will not be allowed (i.e. spikes, etc.).
*Clothing that is pre-approved for a school sport or organization will be allowed with administrative permission.

UNC's Policies
UNC's policies and recommendations for academic misconduct will be followed.

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.

Student Satisfaction Evaluation
Participants will be asked to evaluate the course for instructor's knowledge, interest and enthusiasm.

College Credit / UNC Transcript
Students must complete appropriate paperwork and pay current tuition rates to receive college credit for this course. Students must request official transcript from UNC.

***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://highered.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)

Dropping or Withdrawing from a UNC Dual Credit 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.