

**NEW RIVER COMMUNITY COLLEGE
DUBLIN, VIRGINIA**

COURSE PLAN

Course Number and Title: MTH 261 Applied Calculus I

Prepared by: Mathematics Department Fall 2024
(Date)

Approved by: *S. Tolbert-Hungry* Fall 2024
(Dean) (Date)

I. Course Description

Introduces limits, continuity, differentiation and integration of algebraic, exponential and logarithmic functions, and techniques of integration with an emphasis on applications in business, social sciences, and life sciences. This is a Passport and UCGS transfer course. Lecture 3 hours. Total 3 hours per week.

Prerequisite: Placement or completion of MTH 161: Precalculus I or equivalent with a grade of C or better. Lecture 3 hours per week.

II. Introduction

The course satisfies a mathematics requirement for many degree programs. The course is the end of the mathematics sequence for most transfer degrees. It is designed to develop the skills and concepts which are needed for integral calculus. It does not count toward a degree in engineering.

III. Student Learning Outcomes

Upon successful completion of this course, the student will be able to:

- A. Limits and Continuity
 - a. Calculate and interpret limits at particular x-values and as x approaches infinity.
 - b. Determine whether a function is continuous at a given point and over open/closed intervals.
- B. Derivatives
 - a. Find the derivative of a function applying the limit definition of the derivative.
 - b. Interpret the derivative as both the instantaneous rate of change of a function and the slope of the tangent line to the graph of a function.
 - c. Use the Power, Product, Quotient, and Chain rules to find the derivatives of algebraic, exponential, and logarithmic functions
- C. Applications of the Derivative
 - a. Find the relative extreme values for a continuous function using the First and Second Derivative Tests.
 - b. Apply derivatives to solve problems in life sciences, social sciences, and business.
 - c. Find higher order derivatives and interpret their meaning.

- d. Use derivatives to model position, velocity, and acceleration.
 - e. Apply First and Second Derivative Tests to determine relative extrema, intervals of increase and decrease, points of inflection, and intervals of concavity.
 - f. Graph functions, without the use of a calculator, using limits, derivatives and asymptotes.
 - g. Use derivatives to find absolute extrema and to solve optimization problems in life sciences, social sciences, and business.
 - h. Perform implicit differentiation and apply the concept to related rate problems.
AND/OR
 - i. Evaluate partial derivatives and interpret their meaning.
- D. Integration and Its Applications
- a. Use basic integration formulas to find indefinite integrals of algebraic, exponential, and logarithmic functions.
 - b. Develop the concept of definite integral using Riemann Sums.
 - c. Evaluate definite integrals using Fundamental Theorem of Calculus.
 - d. Use the method of integration by substitution to determine indefinite integrals.
 - e. Evaluate definite integrals using substitution with original and new limits of integration.
 - f. Calculate the area under a curve over a closed interval $[a, b]$.
 - g. Calculate the area bounded by the graph of two or more functions by using points of intersections.
 - h. Use integration to solve applications in life sciences such as exponential growth and decay.
 - i. Use integration to solve applications in business and economics, such as future value and consumer and producer's surplus

IV. General Education Student Learning Outcomes Included in Course

General education at NRCC provides the educational foundation necessary to promote intellectual and personal development. Upon completing the associate degree, graduates will demonstrate competency in student learning outcomes in 1) civic engagement, 2) critical thinking, 3) professional readiness, 4) quantitative literacy, 5) scientific literacy, and 6) written communication.

This course includes the following general education student learning outcomes:

- Explain numerical information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
- Convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words).
- Accurately solve mathematical problems.
- Make judgments and draw relevant conclusions from quantitative analysis of data and predict future trends when appropriate.

V. Instructional Methods

The instructional procedures will include lectures, discussions, in class work, homework, reviews and tests.

VI. Instructional Materials

Textbook: [Business Calculus by Calaway, Hoffman, and Lippman.](#)

Calculator: Students are allowed to use a TI 30XIIS or equivalent.

Software: MyOpenMath <https://www.myopenmath.com/>

Other: Pencils and paper. Ink is not to be used for any graded work

VII. Course Content

- Limits
- Differentiation of polynomials
- Applications of Differentiation
- Rates of Change
- Integration and its Applications
- Exponential and trigonometric derivatives and integrals

VIII. Evaluation

The grade for the course will be calculated from Tests, WebAssign homework, a final exam and other work as deemed appropriate by the instructor. See individual syllabus for details on percentages/points.

IX. Attendance

Regular attendance at classes is required. When absence from a class becomes necessary, it is the responsibility of the student to inform the instructor prior to the absence whenever possible. The student is responsible for the subsequent completion of all study missed during an absence. Any instruction missed and not subsequently completed will necessarily affect the grade of the student regardless of the reason for the absence.

X. Cheating Policy

The giving or receiving of any help from another student or unauthorized individual on any graded portion of the course is considered cheating and will not be tolerated. The use of books, notes, electronic devices or any other unauthorized material during tests is considered cheating, and will not be tolerated. Any student found cheating will receive a grade of "0" on that assignment and may receive an "F" for the course. This "0" cannot be replaced by any other score. Mobile phones are not permitted to be used as calculators.

XI. Withdrawal Policy

Student Initiated Withdrawal Policy

A student may drop or withdraw from a class without academic penalty during the first 60 percent of a session. For purposes of enrollment reporting, the following procedures apply:

- a. If a student withdraws from a class prior to the termination of the add/drop period for the session, the student will be removed from the class roll and no grade will be awarded.
- b. After the add/drop period, but prior to completion of 60 percent of a session, a student who withdraws from a class will be assigned a grade of “W.” A grade of “W” implies that the student was making satisfactory progress in the class at the time of withdrawal, that the withdrawal was officially made before the deadline published in the college calendar, or that the student was administratively transferred to a different program.
- c. After that time, if a student withdraws from a class, a grade of “F” or “U” will be assigned. Exceptions to this policy may be made under documented mitigating circumstances if the student was passing the course at the last date of attendance.

A retroactive grade of “W” may be awarded only if the student would have been eligible under the previously stated policy to receive a “W” on the last date of class attendance. The last date of attendance for a distance education course will be the last date that work was submitted.

Students requesting a late withdrawal due to documented mitigating circumstances should contact the Coordinator of Admissions and Records.

No-Show Policy

A student must either attend face-to-face courses or demonstrate participation in online courses by the last date to drop for a refund. A student who does not meet this deadline will be reported to the Admissions and Records Office and will be withdrawn as a no-show student. No refund will be applicable, and the student will not be allowed to attend/participate in the class or submit assignments. Failure to attend or participate in a course will adversely impact a student’s financial aid award.

Instructor Initiated Withdrawal

A student who adds a class or registers after the first day of class is counted absent from all class meetings missed. Each instructor is responsible for keeping a record of student attendance (face-to-face classes) or performance/participation (online classes) in each class throughout the semester.

When a student’s absences equal twice the number of weekly meetings of a class (equivalent amount of time for summer session), the student may be dropped for unsatisfactory attendance in the class by the instructor.

Since attendance is not a valid measurement for online courses, a student may be withdrawn due to non-performance. A student should refer to his/her online course plan for the instructor’s policy.

When an instructor withdraws a student for unsatisfactory attendance (face-to-face class) or non-performance (online class), the last date of attendance/participation will be

documented. Withdrawal must be completed within five days of a student's meeting the withdrawal criteria. A grade of "W" will be recorded during the first sixty percent (60%) period of a course. A student withdrawn after the sixty percent (60%) period will receive a grade of "F" or "U" except under documented mitigating circumstances when a letter of appeal has been submitted by the student. A copy of this documentation must be placed in the student's academic file.

The student will be notified of the withdrawal by the Admissions and Records Office. An appeal of reinstatement into the class may be approved only by the instructor.

XII. Disability and Non-Discrimination Statements

If you are a student with a documented disability who will require accommodation in this course, please register with the Disability Services Office located in the Advising Center for assistance in developing a plan to address your academic needs.

This College promotes and maintains educational opportunities without regard to race, color, national origin, religion, disability, sex, sexual orientation, gender identity, ethnicity, marital status, pregnancy, childbirth or related medical conditions including lactation, age (except when age is a bona fide occupational qualification), veteran status, or other non-merit factors.

Required Safety Training

Virginia law, effective August 1, 2024, requires campus safety and emergency preparedness training for all students enrolled in on-campus classes at public colleges and universities. The training must focus on an active shooter event and be completed by the last day of their first term in college.

To comply with this legislation, students will view a college-provided awareness and training video during the first two weeks of class for this course.

XIII. Evacuation Procedure

Evacuation Procedure: Please note the evacuation route posted at the classroom doorway. Two routes are marked in case one route might be blocked.

