

**NEW RIVER COMMUNITY COLLEGE
DUBLIN, VIRGINIA**

COURSE PLAN

Course Number and Title: MTH 263 Calculus I

Prepared by: Mathematics Department Fall 2023
(Date)

Approved by: *S. Tolbert-Hungz* Fall 2023
(Dean) (Date)

I. Course Description

Presents concepts of limits, derivatives, differentiation of various types of functions and use of differentiation rules, application of differentiation, antiderivatives, integrals and applications of integration. This is a Passport and UCGS transfer course.
Lecture 4 hours. Total 4 hours per week. 4 credits.

Prerequisite: Placement or completion of MTH 167: Precalculus with Trig or MTH 161/162 Precalculus I/II or equivalent with a grade of C or better. Lecture 4 hours per week. (Credit will not be awarded for more than one of MTH 261 or MTH 263.)

II. Introduction

The course satisfies a mathematics requirement for the for mathematical, physical, and engineering science programs. The course is designed to develop the skills and concepts in analytic geometry and calculus which are needed by engineering students.

III. Student Learning Outcomes

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

A. Limits

- a. Differentiate between the limit and the value of a function at a point
- b. Find the limit of a function by numerical, graphical and analytic methods
- c. Apply Limit Laws
- d. Calculate one-sided limit of a function
- e. Prove the existence of a limit using precise definition of the limit
- f. Determine the continuity of a function
- g. Calculate Vertical and Horizontal asymptotes using limits

B. Derivatives and Differentiation Rules

- a. Define Derivatives and Rates of Change
- b. Compute derivatives of basic functions using the definition of the derivative
- c. Differentiate polynomial, rational, radical, exponential and logarithmic functions
- d. Find equation of a tangent line using derivative
- e. Differentiate trigonometric functions

- f. Apply product, quotient, chain rules
 - g. Apply implicit differentiation and find derivatives of inverse trigonometric functions
 - h. Apply concept of rates of change to natural and social sciences
 - i. Apply the concept of related rates
 - j. Define hyperbolic functions and their derivatives
 - k. Find linear approximation of a function at a given point
- C. Applications of Differentiation
- a. Calculate local and absolute maximum and minimum values of a function
 - b. Apply Rolle's Theorem and Mean Value Theorem to study properties of a function
 - c. Find critical points, and intervals of increasing and decreasing values of a function
 - d. Find points of inflection and intervals of different concavities
 - e. Sketch a curve for a given function
 - f. Apply rules of differentiation to solve optimization problems
 - g. Find antiderivatives for basic functions using knowledge of derivatives
- D. Integrals
- a. Relate areas to definite integrals using sigma notation, Riemann Sums, and limits. [Note: L'Hopital's Rule is in Calc II but may be used for instructional purposes here.]
 - b. Apply Fundamental Theorem of Calculus to find definite integrals and derivatives
 - c. Find indefinite integrals of polynomials and basic trigonometric and exponential function
 - d. Apply Net Change Theorem
 - e. Perform integration using substitution
 - f. Find areas between curves
 - g. Find average value of a function

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:

- Identify the problem or complex issue and its various parts.
- 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 judgements and draw relevant conclusions from quantitative analysis of data and predict future trends when appropriate.

- Demonstrate appropriate workplace and classroom demeanor and behavior e.g., attendance (for online classes this means regular engagement), submissions of assignments by set deadlines and appropriate dress.

V. Instructional Methods

The instructional procedures may include lectures, discussions, in-class work, homework, and tests.

VI. Instructional Materials

Textbook: [Calculus 1 Openstax.](#)

Calculator: See instructor specific requirements. No symbolic/menu driven calculators. Cell phones may not be used as calculators.

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

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

VII. Course Content

- Limits
- Derivatives
- Chain rule for derivatives
- Using derivatives to calculate extrema of a function.
- Using derivatives to graph functions
- Applications of derivatives
- Integration
- Fundamental Theorem of Calculus
- The Substitution Rule for integration

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 instructor 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.

Late withdrawal appeals will be reviewed and a decision made by 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.

In accordance with the No-Show Policy, a student who has not attended class or requested/accessed online learning materials by the last day to drop the class and receive a refund must be withdrawn by the instructor during the following week. No refund will be applicable.

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.

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.