Course Number and Title: Mth 265 Calculus III

Prepared by: Mathematics Department

(Date)

Approved by:

(Dean)   (Date)

I.   Course Description

Focuses on extending the concepts of function, limit, continuity, derivative, integral and vector from the plane to the three dimensional space. Topics include vector functions, multivariate functions, partial derivatives, multiple integrals and an introduction to vector calculus. Designed for mathematical, physical, and engineering science programs.

Prerequisite: Completion of MTH 264:   Calculus II or equivalent with a grade of C or better. Lecture 4 hours per week.

II.   Introduction

The course satisfies a mathematics requirement for the for mathematical, physical, and engineering science programs. This course includes techniques and applications of differential and integral calculus of several variables as wells as sequences and series.

III.   Student Learning Outcomes

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

1.   Sketch vectors in the plane.
2.   Find dot products and cross products.
3.   Express vectors in the plane in algebraic form.
4.   Evaluate vector-valued functions.
5.   Compute the limit, derivative, and integral of a vector valued function
6.   Find curvature and acceleration of functions.
7.   Define lines and curves in three-space.
8.   Find velocity, acceleration, and curvature of functions in three-space.
9.   Find the equation of a plane.
10.   Find the equation of lines and planes in 3-space.Identify, describe, and sketch the graph of cylinders in 3-space.
11.   Identify and sketch the graph of quadratic surfaces.
12.   Evaluate the function at a point in 3-space.
13.   Find the domain and range of the function in 3-space.
14.   Evaluate limits of the function in 3-space.
15.   Determine continuity of the function in 3-space.
16.   Find partial derivatives.

17. Determine a linearization for the function at a point in 3-space.
18. Determine the equation of the plane tangent to the curve at a point.
19. Determine the partial derivative using the chain rule.
20. Determine the gradient at a point.
21. Determine the directional derivative at a point.
22. Determine the tangent plane using the directional derivative.
23. Determine any local extrema.
24. Determine any absolute extrema on a closed and bounded region.
25. Evaluate double integrals.
26. Evaluate iterated integrals.
27. Evaluate double integrals over general regions.
28. Evaluate double integrals in polar coordinates.
29. Solve applications using double integrals.
30. Convert coordinates between rectangular, cylindrical, and spherical coordinates.
31. Write a rectangular equation in cylindrical coordinates.
32. Write a rectangular equation in spherical coordinates.
33. Evaluate triple integrals in rectangular coordinates.
34. Evaluate triple integrals in cylindrical coordinates.
35. Evaluate triple integrals in spherical coordinates
36. Describe vector fields in two and three dimensions graphically; determine if vector fields are conservative, directly and using theorems
37. Identify the meaning and set-up of line integrals and evaluate line integrals
38. Apply the connection between the concepts of conservative force field, independence of path, the existence of potentials, and the fundamental theorem for line integrals. Calculate the work done by a force as a line integral
39. Apply Green's theorem to evaluate line integrals as double integrals and conversely
40. Calculate and interpret the curl, gradient, and the divergence of a vector field
41. Evaluate a surface integral. Understand the concept of flux of a vector field
42. State and use Stokes Theorem
43. State and use the Divergence Theorem

IV. **Instructional Methods**

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

V. **Instructional Materials**

Textbook: James Stewart, Calculus Early Transcendentals, 8th Ed., Brooks/Cole, 2015, ISBN: 978-0-538-49790-9

Software: Enhanced WebAssign homework delivery system bundled with the textbook if purchased through the NRCC Bookstore or to be purchased separately if a used book is purchased.

Calculator: See instructor specific requirements.
Cell phones may not be used as calculators.

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

VI.   Course Content

- Vectors and the geometry of space
- Vector functions
- Partial derivatives
- Limits and continuity of multivariable functions
- Double and triple integrals and their applications
- Polar, rectangular, cylindrical, and spherical coordinate systems
- Vector calculus

VII.   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.

VIII.   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.

IX.   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 of 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.

X.   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 Director of Student Services.

No-Show Policy

A student must either attend face-to-face courses or demonstrate participation in distance learning 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 (DE 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 Distance Education (DE) courses, a student may be withdrawn due to non-performance. A student should refer to his/her DE course plan for the instructor's policy.

In accordance with the No-Show Policy, a student who has not attended class or requested/accessed distance 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 (DE 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.

XI.   <u>Disability and Diversity Statements</u>

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 Counseling Center for assistance in developing a plan to address your academic needs.

The NRCC community values the pluralistic nature of our society. We recognize diversity including, but not limited to, race ethnicity, religion, culture, social class, age, gender, sexual orientation and physical or mental capability. We respect the variety of ideas, experiences and practices that such diversity entails. It is our commitment to ensure equal opportunity and to sustain a climate of civility for all who work or study at NRCC or who otherwise participate in the life of the college.

XII.   <u>Evacuation Procedure</u>

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