

NEW RIVER COMMUNITY COLLEGE

DUBLIN, VIRGINIA

COURSE PLAN

Course Number and Title: MTH 277 Vector Calculus

Prepared by: Pablo Chalmeta
(Instructor)

Fall, 2008
(Date)

Approved by: _____
(Dean)

Fall, 2008
(Date)

Instructor: Pablo Chalmeta

Email: nrchalp@nr.edu

Office: 48 Godbey

Phone: 674-3600 ext. 4266

Office Hours: TBA

I. Course Description

This course includes techniques and applications of differential and integral calculus of several variables as well as sequences and series. Some topics include conics; functions of more than one variable; limits and continuity of multivariable functions; the gradient; extrema; double and triple integrals and their applications; polar, rectangular, cylindrical, and spherical coordinate systems; infinite sequences and series.. Designed for mathematical, physical, and engineering science programs.

II. Prerequisites

MTH 175, 176, 177, and 178, or equivalent.

III. Specific Objectives

Upon completion of this course the student should be able to:

1. Find the equation of lines and planes in 3-space.
2. Identify, describe, and sketch the graph of cylinders in 3-space.
3. Identify and sketch the graph of quadratic surfaces.

The following are for functions of several variables:

4. Evaluate the function at a point.
5. Find the domain and range of the function.
6. Evaluate limits of the function.
7. Determine continuity of the function.
8. Find partial derivatives.
9. Determine a linearization for the function at a point.
10. Determine the equation of the plane tangent to the curve at a point.
11. Determine the partial derivative using the chain rule.
12. Determine the gradient at a point.
13. Determine the directional derivative at a point.
14. Determine the tangent plane using the directional derivative.
15. Determine any local extrema.
16. Determine any absolute extrema on a closed and bounded region.
17. Evaluate double integrals.
18. Evaluate iterated integrals.
19. Evaluate double integrals over general regions.
20. Evaluate double integrals in polar coordinates.
21. Solve applications using double integrals.
22. Convert coordinates between rectangular, cylindrical, and spherical coordinates.
23. Write a rectangular equation in cylindrical coordinates.
24. Write a rectangular equation in spherical coordinates.
25. Evaluate triple integrals in rectangular coordinates.
26. Evaluate triple integrals in cylindrical coordinates.
27. Evaluate triple integrals in spherical coordinates.
28. Determine convergence/divergence of sequences.
29. Determine the limit of a convergent sequence.
30. Determine convergence/divergence of a series using the integral test.
31. Determine convergence/divergence of a series using the comparison tests.
32. Determine convergence/divergence of an alternating series.
33. Determine absolute convergence using the ratio test.
34. Determine power series.
35. Represent functions as power series.
36. Find Taylor and Maclaurin series.

IV. Instructional Procedures

Instruction will be primarily through lecture, making ample use of the blackboard and overhead projection system. Tests and exams are considered as an instructional device as well as a measurement device; questions will be geared toward forcing students to think for themselves and to tie together the facts and concepts presented in class. Interaction with the class is considered a valuable aid to instruction; therefore, questions and comments from students will frequently be solicited. The attempt is made to make lecture content as relevant and interesting to students as possible.

V. Instructional Materials

Textbook: James Stewart, Calculus Early Transcendentals, 6th Ed., Brooks/Cole, 2007,
Calculator: Ti86 or 89
Software: Matlab 6 (optional)

VI. Homework and Quizzes

Giving your best effort on homework is the single best thing you can do to help you learn mathematics. There will be at least one homework quiz every week. The homework quiz will consist of one problem from the homework assigned the previous class.

VII. Evaluation Criteria and Grading Scale

The grade for this course will be derived from the quizzes, three tests and a final.

Quizzes	15%
Tests	60%
Final	25%

There will be no make-up tests. The final exam grade will be substituted for the lowest test grade if it improves your average.

Letter grades will be assigned based on your final percentage as follows:

90 – 100	=	A
80 – 89	=	B
70 – 79	=	C
60 – 69	=	D
0 – 59	=	F

Note: I do not curve grades. I do not “give” grades. You earn what you get, so plan to work accordingly.

VIII. E-mail Policy

If you send me an e-mail, you should include a **descriptive** subject line. Please remember to use complete sentences and follow the rules of grammar. Do not expect a prompt reply to your e-mails concerning last minute questions about an exam the next day.

IX. Withdrawal Policy

Student Initiated Withdrawal Policy:

A student may drop or withdraw from a class without academic penalty during the first sixty percent (60%) of the 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 sixty percent (60%) of a session, a student who withdraws or is withdrawn from a course will be assigned a grade of "W"
- c. After that time, if a student withdraws from a class, a grade of "F" will be assigned.

A student may be awarded, retroactively, a grade of "W", if and only if, the student would have been eligible under the previously stated policy to receive a "W" on the last date that he/she attended class.

1. The student must appeal for a grade of "W" based on attendance.
2. The admissions and Records staff will collect the relevant documentation for the appeal, including the last date of attendance, from the instructor of the course that is being appealed and other relevant documentation when mitigating circumstances are to be considered. For an appeal related to a distance education course (IDL), the last date that the work was submitted will be considered the last date of attendance.
3. All relevant documentation will be reviewed by the Director of Student Development and the withdrawal policy strictly applied in determination of changing the grade to "W".
4. If the student ceased attending class during the first 60% of the semester, a grade of "W" will be given. If the last date of attendance falls beyond the sixty percent mark, the student must demonstrate mitigating circumstances and must have been passing before a grade of "W" will be awarded.
5. Appeals asserting mitigating circumstances must be further reviewed by and a determination made by a committee of faculty appointed by the Dean of Instruction and Student Services.

A grade of withdrawal implies that the student was making satisfactory progress in the class at the time of withdrawal, or that the withdrawal was officially made before the deadline date published in the college calendar, or that the student was administratively transferred to a different program.

Instructor Initiated Withdrawal Policy

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 in each class.

Students who have not attended class by the last day to drop class and receive refund must be deleted by the instructor during the following week. No refund will be applicable.

When a student's absences equal twice the number of weekly meetings of a class, the student may be dropped for unsatisfactory attendance in the class by the instructor.

When an instructor determines that absences constitute unsatisfactory attendance, a Faculty Withdrawal Form should be completed and submitted to the Admissions and Records Office. The last date of attendance must be documented. A grade of "W" will be recorded during the first sixty percent (60%) period of the course. Students withdrawn after the sixty percent (60%) period will receive a grade of "F" except under mitigating circumstances, which must be documented. 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 for reinstatement into the class may be approved only by the instructor.

X. Cheating

The giving or receiving of any help on any graded portion (computer or written) of the course is considered cheating and will not be tolerated. Any student found cheating will receive a grade of "0" on that portion and possibly an "F" for the course. This "0" will not be replaced by the final exam score. When you are doing a computer Evaluate you are not allowed to use your book or notebook.

XI. Additional Information:

- Any student with special needs or circumstances should feel free to meet with me during office hours.
- I will be happy to schedule a time to help you with this course at times other than my scheduled office hours. The best way to get in touch with me is via email.

Homework Stewart 6e

<u>Day</u>	<u>Section</u>	<u>Topic</u>	<u>Problems</u>
1	12.5	Lines and Planes in 3-Space	Page 802 # 3, 7, 12, 23, 31, 61
2	12.6	Cylinders and Quadric Surfaces	Page 810 # 1(a)(b), 3, 4, 9(a), 11, 21, 22, 23, 24, 25, 26, 27, 28, 29
3	12.6	Quadric Surfaces	Page 811 # 31, 36, 41, 42
4	14.1	Functions of Several Variables	Page 865 # 2, 7, 8, 10, 13, 17, 25, 30, 32, 34, 40, 48, 55 - 60
5	14.2	Limits and Continuity	Page 877 # 2, 5, 6, 10, 14, 16, 29, 37 - 40
6	14.3	Partial Derivatives	Page 888 # 1, 3, 10, 16, 17, 23, 32, 39, 41, 51, 52, 54, 69, 80
7	14.4	Linearizations and Tangent Planes	Page 899 # 3, 4, 11, 12, 21
8	14.4	The Differential	Page 899 # 25, 26, 33, 35, 38
	14.5	The Chain Rule	Page 907 # 2, 7, 12, 13, 21, 22, 33, 40
9	14.6	The Gradient and Directional Derivatives	Page 920 # 1, 5, 7, 13, 16, 20
	14.6	Directional Derivatives and Tangent Planes Revisited	Page 920 # 21, 28, 35, 36, 38, 39(a), 44(a), 47
10	14.7	Local Extrema	Page 930 # 2, 3, 7, 8, 10, 13
	14.7	Absolute Extrema on Closed and Bounded Regions	Page 930 # 30, 31, 34, 35, 50
11	15.1	The Double Integral	Page 958 # 4, 5, 9, 14
	15.2	Iterated Integrals	Page 964 # 3, 9, 11, 30, 36
	15.3	Iterated Integrals	Page 972 # 1, 3, 6
12	15.3	Double Integrals over General Regions	Page 972 # 8, 13, 15, 20℞, 26℞, 41, 43, 47, 50, 52℞
13	15.4	Double Integrals in Polar Coordinates	Page 978 # 8, 13, 14℞, 18, 22℞, 24, 25, 29, 35℞, 36(a)
14	15.5	Applications of Double Integrals	Page 988 # 5℞, 8℞, 9, 11℞, 12℞
15	15.6	Triple Integrals in Rectangular Coordinates	Page 998 # 3, 12, 16, 17, 20, 28, 33
	15.6	Triple Integrals in Rectangular Coordinates	Page 998 # 21℞, 22℞, 23(a)℞, 34, 38℞, 40℞, 51
16	15.7	Cylindrical and Spherical Coordinate Systems	Page 1004 # 3, 5, 6, 7, 8, 9, 15, 16, 18℞, 20℞, 21, 23℞, 27
17	15.8	Triple Integrals in Cylindrical and Spherical	Page 1010 # 3(a), 4(b), 5 - 9, 17, 18, 23℞, 26, 30℞, 32(a)℞, 32(b)℞, 39
18	11.1	Sequences	Page 684 # 4, 5, 7, 9, 18, 19, 22, 26, 29, 31, 35, 38, 39, 40 $\lim_{n \rightarrow \infty} \left(1 + \frac{a}{n}\right)^n$
19	11.2	Infinite Series	Page 694 # 9, 10, 11, 12, 17, 18, 19; Page 759 # 29
20	11.2	Infinite Series	Page 694 # 24, 25, 26, 28, 29, 47, 48, 58(a)(b)
21	11.3	The Integral Test	Page 703 # 1, 2, 3, 4, 7, 11, 21, 22
22	11.4	The Comparison Tests	Page 709 # 1, 2, 3, 4, 5, 8, 9, 16, 22, 23, 24, 25
	11.5	Alternating Series	Page 713 # 3, 4, 7, 8, 10, 13, 15, 23, 24, 31
23	11.6	Absolute Convergence and the Ratio Test	Page 719 # 1, 2, 5, 6, 10, 11, 12, 14, 18, 31(a)(b)(c)
	11.7	Strategies for Testing Series Convergence	Page 722 # 1, 2, 3, 4, 10, 11, 12, 26, 28
24	11.8	Power Series	Page 727 # 3, 7, 8, 9, 10, 15, 17, 20
25	11.9	Representation of Functions as Power Series	Page 733 # 3, 8, 23, 27, 38(a)
26	11.10	Taylor and Maclaurin Series	Page 746 # 5, 6, 8, 16, 20, 32
27	11.10	Taylor and Maclaurin Series	Page 746 # 43, 47, 51, 57, 63, 64