DEPARTMENT OF MATHEMATICAL SCIENCES
U.S.M.A.

INSTRUCTIONAL MEMORANDUM 29 December 2008
NUMBER 363-2009-2

Lesson Attendance & Assignment Schedule

MA363 – Vector Calculus and Ordinary Differential Equations

1. Purpose: This memorandum specifies material, describes the goals and philosophy, and announces policy and procedures for this course.

2. Texts:
a. Schey, H.M., div, grad, curl, and all that. 4th ed. New York, NY: W. W. North & Company, 2005.
b. Boyce, William E. and DiPrima, Richard C., Elementary Differential Equations and Boundary Value Problems. 9th ed. New York: John Wiley & Sons, 2005.

3. Goals and Objectives. This is a one semester course in vector calculus and ordinary differential equations designed specifically for math and physics majors. Trends in mathematics continue to require its applications to engineering and physics. Vector analysis is the language of mechanics and electromagnetism and has been since the beginning of the 20th century. Regarding ordinary differential equations, William E. Boyce stated

> *A course in elementary differential equations is an excellent vehicle for displaying the interrelations between mathematics and the physical sciences or engineering. Before the engineer or scientist can use differential equations with confidence, he or she must master the techniques of solution and have at least a rudimentary knowledge of the underlying theory. Conversely, the student of mathematics benefits greatly from a knowledge of some of the ways in which the desire to solve specific problems has stimulated work of a more abstract nature.*

This course will advance your understanding of mathematical concepts and develop your skills in applying mathematics. Applying mathematics consists of formulating and solving mathematical problems as well as interpreting and explaining results. The goal is to provide you a solid foundation in vector calculus and ODE concepts.

a. There are two key goals for you in MA363. You will:
- Have the confidence and ability to effectively use vector calculus and applied math concepts to solve problems.
- Have the ability to effectively communicate the results of your mathematical work.

b. The goals stated above support the following specific math electives program goals:
- Model physical phenomena.
- Understand and apply theorems and methods.
- Achieve proficiency in breadth and depth courses
- Investigate utility via modeling, problem-solving, and interdisciplinary applications.

- Effectively communicate the following both verbally and in writing: modeling, analysis, and consequences/significance.
- Employ Mathematica, Excel, and other technologies as aids in solving more sophisticated problems.
- Develop student attitudes: creative and curious, increasing individual responsibility and a commitment to lifelong learning.

c. Your goal in this course should be to improve your problem solving skills, to apply, increase, and sharpen your mathematical abilities and understanding. You will encounter many fundamental principles and results in the realms of vector calculus and ordinary differential equations. You should seek to place the material in this course into the context of your studies in other courses thus achieving a broader understanding of mathematics.

4. Evaluation: In class, quizzes, exams, daily recitations, and a comprehensive final examination will be used to assess your understanding and abilities.

a. Point distribution.

Requirement	**Weight (%)**	**Points**
Quizzes	40	400
WPRs	30	300
TEE	30	300
Total	**100**	**1000**

b. Written Partial Reviews will be administered during the normal class period. You should notify me immediately of any conflicts with these examinations. If you miss one WPR, you may be required to make it up or take a make ahead examination. If a missed WPR is not taken, the weight of your other graded requirements will increase accordingly. Subsequent missed WPRs must be made up.

5. Preparation and assistance: The topics and objectives for each block are at Enclosure 1. You should use these objectives and lesson assignments to prepare daily for class. For assistance outside the classroom, I encourage you to work with others as well as seeking my assistance. When seeking my assistance out of class, if a period of time is needed, be considerate and make an appointment.

6. Authorized references for examinations (excluding quizzes).
   a. USMA issued calculator and computer notebook.
   b. One sheet 8 ½ by 11 inch reference page (front and back).
   c. Shey, H.M., *div, grad, curl, and all that*, 4th Edition.
   d. Boyce, William E. and DiPrima, Richard C., *Elementary Differential Equations and Boundary Value Problems*. 9th Edition.
   e. Stewart, James, *Concepts and Contexts*, 3rd Edition, or any other Stewart Calculus text.

No other references are authorized unless specifically identified by your instructor.

7. Final course grades will follow the math department's standing guidelines. Scores in the listed ranges are guaranteed, with plus and minus refinements being made at the end of the semester.

Percentage achieved	Grade
$90 \leq$ Mark ≤ 100	A
$80 \leq$ Mark < 90	B
$73 \leq$ Mark < 80	C
$70 \leq$ Mark < 73	C-
$65 \leq$ Mark < 70	D
$0 \leq$ Mark < 65	F

A final course average of less than 65% or a score of less than 50% on the TEE (regardless of final course average) may indicate insufficient knowledge and ability and may result in course failure.

8. Student Growth:

a. All graded exercises in this course are individual. It is appropriate to consult sources of information beyond the course text, and I encourage you to do so. Documentation of your effort should follow the guidance you have been issued regarding documentation of written work. If any confusion arises regarding documentation, discuss the matter with me prior to submitting your work.

b. You should continue the practice of maintaining a student portfolio as you may have done in the Core Mathematics Program. You should keep your quizzes, and (if you wish) your notes in a single notebook for future reference. In addition, a Mathematica folder dedicated to the contents of MA363 could prove effective. Whatever you employ, try to develop some system that will support your continuing education.

c. As your instructor, I will strive to give you the opportunity to discover knowledge, to evaluate your effort fairly, and to provide you assistance and feedback. It is your responsibility to take your education seriously, to prepare for class, and put forth your best effort in the discovery of knowledge. I am confident that each of us will do his or her part and that together we will have a rewarding educational experience.

ARCHIE WILMER III
LTC, OD