DEPARTMENT OF MATHEMATICAL SCIENCES
United States Military Academy

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INSTRUCTIONAL MEMORANDUM 2 January 2009

NUMBER 255-2

MA255 – Mathematical Modeling and Introduction to Differential Equations

1. **Purpose:** This memorandum announces lesson assignments and instructional guidance for MA255.

2. **Text:**

   a. Differential Equations: An Introduction to Modern Methods & Applications, Brannan & Boyce, 2007.
   b. Differential Equations with Mathematica; Hunt, Lipsman, Osborn, Outing, & Rosenberg; 2008

3. **Software:**

   a. *Mathematica* - Wolfram Research, Inc.
   b. *WileyPLUS* – John Wiley & Sons, Inc.
   c. Word – Microsoft Corporation.
   d. Excel – Microsoft Corporation.

4. **Attendance Schedule:**

   a. MA255 is a 4 credit hour course and therefore ***does not*** follow the Day 1 / Day 2 schedule of a 3.0 credit hour course. Your academic schedule reflects which hour you are scheduled for MA255. The course schedule tells you which days you have classes and exams. Refer to the course schedule on the MA255 website: http://www.dean.usma.edu/departments/math/courses/ma255/ for further information. You are required to be in class during your scheduled hour on the dates indicated.
   b. Attendance at Written Partial Reviews (WPR) is mandatory. Except in emergencies, cadets will not make any appointments that could preclude their attendance for a WPR. Any cadet missing a WPR will be required to take a make-up exam.

5. **Course Evaluation Plan:**

Event	Points	Percent
Instructor Points	300	10%
WPR 1	300	30%
WPR 2	300	
WPR 3	300	
Graded Homework	300	20%
Tech Lab Reports	300	
Project	300	10%
TEE	900	30%

6. **Course Summary:**

Advanced Lessons	47
Written Partial Reviews	3
Technology Labs	6
Problem Solving Labs	8
TOTAL ATTENDANCES	64

7**. Lesson Assignments.** The Lesson Attendance and Assignment Schedule (Syllabus) is available on the course website: http://www.dean.usma.edu/departments/math/courses/ma255/. The Course Objectives document is also located on the course website.

8**. Grading:**

a. Final course grades will follow the Department of Mathematical Sciences guidelines:

Percentage Mark	Grade
$90 \leq \text{Mark} \leq 100$	A
$80 \leq \text{Mark} < 90$	B
$70 \leq \text{Mark} < 80$	C
$65 \leq \text{Mark} < 70$	D

b. Cadets who score less than 50% on the TEE, regardless of their final course average, or whose final course average is less than 65% may fail the course.
c. Instructors may award up to 30 bonus points at their discretion. Bonus points are added directly to the number of points earned for the semester.

9. **Writing**. The requirement of you, a student of mathematics, to write about your mathematical knowledge is designed to ensure that you can communicate effectively as well as to ensure that you think clearly and logically. At various times throughout the semester, you will need to describe the reasoning process you used in a particular solution technique or problem. You will have to express your understanding or interpretation of the results of a problem. You will contrast problem-solving techniques. You will have to convey in an articulate manner your understanding of a concept and its applications. As in other courses, you should think about substance, organization, style and correctness. To assist you in developing a clear and concise writing style, the following guidance is provided:

a. Effective communication requires proper use of the English language. A correct solution garbled by improper English may be worthless to the reader. The rules of grammar apply to mathematics. Present one idea at a time. Since an idea is expressed by a complete sentence, write in complete sentences.
b. Strike a balance between words and symbols. The notation of mathematics is clean and precise.
c. Honor the equal sign. Quantities on either side of an equal sign must be equal, and the equal sign is not a punctuation mark. (Example: n = even = $2n$ where the student means to say, "If n is even, then $n = 2k$ for some k".)
d. Use different symbols to represent different variables. (Example: If tasked to write an equation showing that n is a power of 2, you might incorrectly write $n = 2^n$. Instead, you should write something like $n = 2^k$ for some k.)
e. Define your terms. State at the beginning what your symbols mean. The reader does not know what your symbols and terms are unless you clearly articulate their meaning.
f. Give reasons. Indicate the main points in a problem. Help the reader through the hard parts. Be explicit.
g. Be aware of format. Organize your thoughts. Break up long paragraphs. Write equations on separate lines. Be considerate to the reader and make your paper logical and concise.
h. Answer the question. When you finish the problem, go back and read it again. Be sure that you have given a clear answer to the question asked.

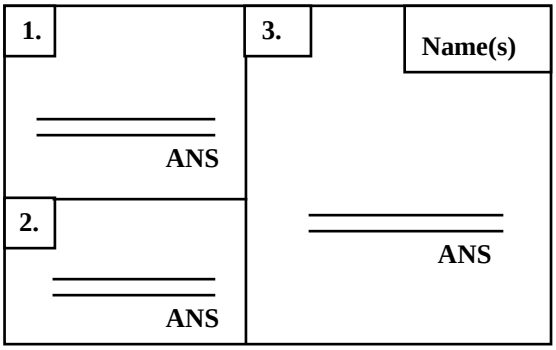
10. **Out of Class Work:**

a. As part of each in-class lesson, you are expected to read the appropriate chapters from the course texts and complete the assigned daily problems from the course texts. Successful completion of the daily problems will significantly improve your understanding and performance in class. In addition to assigned text problems additional problems may be found on the *WileyPlus* website. Your instructor will be able to monitor your completion of these problems and may assign a portion of their Instructor Points to this aspect of the course.
b. All graded out of class work constitutes homework as defined in the Dean's *Documentation of Written Work* (*DWW*). You will prepare and submit homework in accordance with the Dean's *DWW*. Refer to the Dean's *DWW* for further information on utilizing that style for documentation.

11. **Study Suggestions.** Math is not a spectator sport. You must *practice math* to *learn math*. The course objectives are linked to the Course Website. Cadets should use these guidelines to prepare for class. A critical element of your preparation is completion of the homework problems. You are encouraged to complete the additional recommended exercises as well (found on the *WileyPlus* website). Instructors may use these problems as they see fit to evaluate your preparedness. If assistance is needed outside of class, cadets are strongly encouraged to work with their classmates. In Thayer Hall, the Department of Mathematical Sciences' Math Clinic (room 226) is available for individual study and group study. You may also use the meeting room in TH256 if it is available. If you desire an instructor's assistance for study, make an appointment directly with that instructor. E-mail is an excellent tool for scheduling additional instruction and for posing questions.

12. **Classroom Rules.** All cadets are expected to maintain proper military bearing and appearance during instruction in accordance with appropriate regulations.

a. MA255 instructors will set the drinking rule for his/her class. MA255 instructors will be responsible for any clean-up that becomes necessary as a result of drinking.
b. No eating or chewing of gum in class.
c. No tobacco use in class.
d. No sleeping in class.
e. No profanity in class.
f. Backpacks will be stored in the hallway. Only materials needed for MA255 are allowed on your desk.
g. At the blackboard, print your name in the upper right corner and separate work that relates to distinct parts of an assignment.



h. In all work, be logical, neat and organized.
i. Rules common to blackboards, written work, and examinations:
    1. Use a straight-edge to draw straight lines.
    2. Draw and label figures or graphs when appropriate.
    3. Double underline each answer and write "ANS" after it.
    4. Report numerical answers using the appropriate number of significant digits.
j. Recitation procedures:
    1. When called upon to recite, a cadet will stand on that side of the blackboard which least obstructs the view of the rest of the class and will use a pointer to point out details of the board problem.
    2. The cadet will make the oral presentation in a manner similar to the following:

i. Give a brief but clear statement of the problem to be solved.
ii. State the planned method of solving the problem.
iii. Explain the major steps in the solution.
iv. Ask for questions and lead the classroom discussion of the problem.
v. Address the students of the section, not the instructor, nor the blackboard.

3. Other members of the class will position themselves so that they can observe the recitation.

13. **Documentation.** All cadet work in MA255 will be in accordance with the procedures found in the booklet entitled *Documentation of Written Work, August 2008*. The format will follow guidelines from *The Little, Brown Handbook*. Requirements for out-of-class graded exercises apply to all graded exercises assigned by your instructor.

14. **Projects Submissions.** Projects are formal group, out-of-class, graded exercises. Submit projects in a brown folder with serviceable nametapes on the cover. Your instructor may tell you that a cover sheet is sufficient and to disregard the need for a brown folder. Most technical papers are divided up into about a half-dozen sections, which are titled. Most papers have an abstract, and introduction, a number of sections of discussion, and the appropriate documentation. On occasion, papers have appendices, which give special detailed information. Generally, you will receive some guidance from your instructor on the format of your technical report. Technical papers will be treated as a writing assignment: they should be grammatically correct. The content should also be mathematically correct.

15**. Course Philosophy.** MA255 is an introduction to differential equations course with a focus on mathematical modeling. Your instructor will expect you to come to class prepared for the lesson and ready to participate. Be logical, be neat and be organized in your work. See the enclosed course goals and objectives for further information. The efforts you make outside of class will ensure the 55 minutes in class are most productive for learning.

16. **Military Relevance**. MA255 teaches problem solving, communications, and learning skills. Your job as an Army Officer requires you to be an innovative problem solver. Your ability to communicate effectively is an essential element of your success. Learning to read mathematics books also relates to learning from Army Technical Manuals and Field Manuals and the concept of self-study. You will find that the skills emphasized in MA255 and throughout the mathematics core sequence at USMA help prepare you for success in the Army.

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