

DEPARTMENT OF MATHEMATICAL SCIENCES
United States Military Academy
West Point, NY 10996

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INSTRUCTIONAL MEMORANDUM
NUMBER 104-2

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MA104 – Differential Calculus

1. Purpose: This memorandum describes the goals and philosophy, specifies materials, and announces policy and procedures for MA104.
2. Goals and Objectives: This course is designed to advance your understanding of mathematical concepts and to develop your skills in quantitative reasoning and PROBLEM SOLVING. You will use quantitative reasoning and problem solving skills as an officer and as a cadet *regardless of your major*. The overarching goals for MA104 are for you to 1) understand the concept of the derivative as a rate of change and 2) apply this concept to model and solve problems involving changing quantities. Additional goals of this course are listed below.
 - a. Use and relate the analytical, graphical, numerical, and verbal representations of behaviors, functions, and models.
 - b. Use technology appropriately to gain insight into a solution of a problem.
 - c. Appreciate the relevance of continuous mathematics in problem solving by investigating interdisciplinary application problems.
 - d. Write about solutions in the context of the original applied problem.
3. Evaluation: Your performance in this course will be evaluated both in and out of class. Out of class efforts may consist of homework and a project. In-class efforts may consist of written exercises, presentations, Fundamental Derivatives Exam (FDE), Written Partial Reviews (WPRs), and a comprehensive final examination. ***Success in this course depends heavily on your daily preparation.*** Without a concerted effort on your part, you will not achieve the level of understanding necessary in this course to be successful in future mathematics, science, and engineering courses. Following is the distribution of points for the course:

a. Point Distribution.

<u>Requirement</u>	<u>Points</u>	<u>Weight (%)</u>
Project	300	15
Instructor Points	300	15
Derivatives Exam (FDE)	100	5
WPRs(3)	700	35
TEE	600	30
Total	2000	100

- b. Final course grades will follow this Department's standing guidelines.

<u>Percentage Achieved</u>	<u>Grade</u>
$90\% \leq x \leq 100\%$	A
$80\% \leq x < 90\%$	B
$69\% \leq x < 80\%$	C
$65\% \leq x < 69\%$	D
$x < 65\%$	F

c. The Fundamental Derivatives Exam (FDE) is designed to assess a student's knowledge of the rules associated with taking derivatives of elementary single-variable functions. Your success in MA104, as well as subsequent math, science, and engineering courses, depends on a firm understanding of these fundamental differentiation rules. Students must earn an 80% or higher on the FDE in order to be considered for advancement to the next core mathematics course. The FDE scheduled during Lesson 10 will count toward your final grade in MA104 and provide you with the opportunity to satisfy this requirement. Students who do not earn an 80% or higher on the first FDE will be required to retake the exam.

d. 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 or ability and may result in course failure.

4. Course Materials:

- a. Text: Calculus Early Transcendentals, J. Stewart, Thomson and Brooks/Cole, 2008, 6th Edition.
- b. MA104 Homepage: <http://www.dean.usma.edu/math/courses/MA104/default.htm>
- c. Laptop with *Mathematica 6.0*

5. Professional Development:

a. This course is a study in *modeling* and *inquiry*. It is different than most other mathematics courses you may have taken. The emphasis is on modeling and discussion and not on finding an answer and double-underlining that answer. You should be able to *model* difficult problems. Using various resources to solve those models will become second nature. However, finding a solution is not the ultimate goal. You must then be able to communicate and discuss the relevance of your solution in the context of the problem. Does the answer make sense? How could assumptions change the model? Do you have enough tools to refine the solution? This is *inquiry* and is just as important as modeling.

b. As well as being evaluation tools, the project and writing assignments in this course are exercises through which you can continue to build your skills in preparing quality written

work. Timely, professional effort is expected. Moreover, you are encouraged to take full advantage of the resources available to you and to submit a product that reflects your best effort.

c. When seeking out-of-class assistance from your instructor, if a period of time is needed, be considerate and make an appointment. You are required to prepare for Additional Instruction (AI). Come with specific questions, it is important that you identify precisely what you do not know.

6. Scholarship: This course is designed to build upon your previous instruction in mathematics as well as to explore new concepts. It is therefore appropriate (and you are encouraged) to consult sources of information beyond the course text. In doing so, keep in mind the objectives of this course and the standards of scholarly work. Documentation of your effort should follow the guidance contained in *Documentation of Written Work*, O/Dean, August 2008 and The Little Brown Handbook. If any confusion arises regarding documentation, discuss the matter with your instructor **prior to submitting your work**.

7. Finally, this is **your** mathematics education. You are ultimately responsible, so get involved! Your instructor is here as a resource to help guide you through the educational experience this course offers, but he or she is only one resource. There are many others. A successful leader uses all possible resources to complete the mission. As I stated at the outset of this memo, the quantitative reasoning and problem solving skills that you continue to develop in this course will serve you in the future regardless of your major as a cadet or your branch as an officer. Use this opportunity to develop confidence, competence, and good habits of mind. These are the ends which we will use mathematics as a means to reach. I wish you the best in MA104, in the rest of your cadet experience, and in your future service to the Nation.

WILLIAM L. FEHLMAN II
LTC, OD
MA104 Program Director