

MATH 108 – Intuitive Calculus with Applications

Spring 2010

Professor: Dr. Marlin Eby

Education

- H.S., Lancaster Mennonite High School
- B.A. (Mathematics), Millersville University
- M.Stat. (Statistics, Mathematics minor), University of Florida
- Ph.D. (Statistics), University of Florida

Positions

- Professor, Department of Mathematics and Statistics, University of South Carolina
- Statistical Consultant, Info Tech, Inc., Gainesville, FL
- Professor, Department of Mathematical Sciences, Messiah College

Office: Frey 322

Phone: 6850 – 24-hour access: 691-6021 (extension 6850)

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Office Hours: If my office hours conflict with your schedule, contact me to schedule another time.

Monday: 10:20 - 11:20

Tuesday: 10:45 - 12:15

Wednesday: 3:00 - 4:00

Thursday: 12:25 - 1:55

Friday: 9:10 - 10:10 and 11:30 - 12:30

Help Sessions: starting now and continuing through the final exam week

Monday, Tuesday, Wednesday, and Thursday

7:00 - 9:00 p.m. in Frey 341

- Even if you do not have specific questions, you can benefit from listening as our assistants answer other students' questions.
- Take your class notes and handouts to the Help Room so that the staff can see how topics were presented in class.

Course Prerequisite

- Algebra II in high school
- A high school calculus course is not a prerequisite.

Course Audience

- students majoring in accounting, biochemistry, biology, business administration, business information systems, economics, environmental science, finance, human resource management, international business, management, marketing, pre-med, pre-medical technology, pre-physical therapy, Spanish business, or sport and exercise science
- **nonmajors** who elect this course to satisfy the Mathematical Sciences General Education requirement, because it is more consistent with their background and abilities

Course Objectives

This one-semester course covers the basics of differential and integral calculus and their application in solving real-life problems. Concepts are developed and presented intuitively without the rigor of mathematical proofs

that are part of the traditional three-semester calculus sequence. This course is exclusively for nonmajors who are required to take this course as a foundation for courses within their majors.

- If you suffer from mathematical anxiety, do not look at the entire course. Instead, take it one day at a time.
- Even though many of you are required to take this course, a positive attitude will go far toward making this course a rewarding experience.

Specifically, the objectives for this course are for you to:

- develop an intuitive understanding of functions and the concepts of differentiation and integration
- learn by considering each topic geometrically, numerically, and algebraically with an emphasis on the intuitive presentation
- understand the breadth of mathematics by seeing applications in a wide variety of fields
- use the tools of Calculus to formulate and solve multi-step problems, and to interpret the numeric results
- be able to recognize calculus concepts in the context of written problems and implement the corresponding processes

Mathematical Sciences General Education Objectives

By the completion of this course the student will demonstrate the ability to

- identify methods and assumptions of the mathematical sciences.
- understand at least one of the three mathematical sciences of computing, mathematics, and statistics from a liberal arts perspective.
- think logically, analytically, and abstractly through engagement in quantitative problem-solving activities.

Text

- Calculus and Its Applications, 9th edition by Bittinger and Ellenbogen (0-321-39534-4)

There is no mystery about what is expected of you on quizzes and exams since all material that I expect you to learn will be covered in **class** or in the **suggested homework**, with the exception of the *Algebra Review* material. Thus, your notes, handouts, and suggested homework problems give you a complete guide as to what is expected both in content and method. In choosing the text for this course, I sought to find the text that most closely matches the topics and methodology presented. The match is not perfect, and there will be some discrepancies between the text and the class presentation. Our text is good, but you should never use it as your primary resource, since you would miss some of what is expected of you. The appropriate role of the text is to supplement and reinforce your understanding.

Grades

The grading policy is designed to ensure fairness for all students. The procedure for determining your course grade is explicitly detailed in this section. This allows you to determine your grade at any time in this course based on the items that have been returned to you after grading.

- Your course grade will be determined solely on your performance on the following components.
- Thus, extra credit will never be an option in this course.
- Partial credit is given for partially correct solutions.

Unit Exams: 3 @ 100 points

300 points

- February 26 (Friday)
March 31 (Wednesday)
April 28 (Wednesday)
- **not explicitly** cumulative

Final Exam

125

- Monday, May 10 @ 10:30

- cumulative

Quizzes: 7

100

- February 12
- February 19
- March 5
- March 12
- March 26
- April 16
- April 23
- lowest score is dropped
- percentage of total points earned on the remaining quizzes is applied to 100 points
- given at the beginning of class
- each quiz will consist of problems similar to the suggested homework for the sections covered since the last quiz or exam

Homework Project

20

Total 545 points

The course grade will be determined on the basis of total points earned as a percentage of 545. The following percent cutoffs will be used to determine your course grade.

Percent Cutoff	Grade	Total Points Cutoff
93	A	507
90	A-	491
87	B+	475
83	B	453
80	B-	436
77	C+	420
73	C	398
70	C-	382
67	D+	366
60	D	327
0	F	

- Your grade is determined totally by your demonstrated level of mastery of the material and not by your relevant standing within the class or the performance of the class as a whole. That is, there will be no curving of any grades.
- Good grades are not uncommon in this course but are usually achieved only with serious effort.

Formula Sheet and Calculator

- For each unit exam, you may use one side of an 8½" × 11" handwritten sheet.
- For the final exam, you may use a total of three sides.
- On quizzes and exams, you may use a calculator.
 - You may not use any of your calculator's graphics, calculus, or algebra capabilities. That is, a calculator is to be used only for calculations.
 - Your calculator must be a stand-alone unit, not part of some other device like a cell phone.
 - You must have your own calculator for quizzes and exams.
 - You are expected to know how to use your calculator before quizzes and exams.

Algebra Review

This course begins with a quick review of functions and algebraic concepts that are essential to MATH 108.

As part of this review, you are responsible, mostly on your own, for the material and problems in **Sections R.1 - R.4, R.5 (quadratic only – pp. 56 - 60)**, and the **Appendix**.

It is a fact that students with weaknesses in the essentials tend to experience difficulties in MATH 108. If you are weak in these essentials, you might consider taking the two-part first course in calculus, MATH 109 and MATH 110. These courses are offered in the fall semester and J-term, respectively. This two-part first course is specifically designed for students who are weak in the essentials. In fact, students in MATH 111 (the traditional Calculus I) are given a gateway exam at the beginning of that course. Students who score low on that exam are then required to take MATH 109 and MATH 110 instead of MATH 111.

Course Outline: in order of coverage

Chapter	Sections Covered
Appendix	all
R	1 - 5
1	1 - 8
2	1 - 5 and 6: pp. 275-7
3	1 - 4
4	1 - 7
5	3

To assist in summarizing each chapter, use the following at the end of each chapter:

- Chapter Summary
- Chapter Review Exercises
- Chapter Test

In addition, use the *Cumulative Review* in the back of your text.

Note

If you experience difficulties after reviewing your class notes and handouts, reading the text again, and attempting the suggested homework problems, you need to seek help before the quiz or exam.

Questions are welcomed at any time during class. However, the first part of each class before a quiz or exam will usually be reserved for questions on homework. Of course, homework questions can always be asked outside class (e.g., in my office and during evening help sessions). Please reserve homework questions for those problems which you have seriously attempted to solve. If you have questions, ask them. Don't be concerned about what your classmates might think. Students benefit most from asking specific questions. If you do not understand my answer, ask a follow-up question or seek clarification.

Because of my flexible lecturing style, each day's lecture will end at a natural breaking point but not necessarily at the end of a section. Reading should be done prior to class discussion so that you have an introduction to the topics that will be covered. Reading should also be done after the class discussion to provide additional insights and coherence.

Before attempting homework problems, you should actually replicate the work from the examples given on the board or handouts in class. Unless you actually work through these examples, you may be lulled into thinking that you clearly understand the steps involved and do not need to practice performing them before a quiz or an exam. By attempting to replicate the work from the class examples as your first task after class, you will identify weaknesses before it is too late to correct them.

Some of you have had a calculus course in high school. However, this may not be an asset for you. In fact, it will be a liability for you if you do not move beyond the high school mind-set or think that there is nothing new for you to learn in this course. MATH 108 is a college calculus course – not a high school calculus course. Thus, it is likely to be more rigorous than your high school course where the emphasis may have been on the

how. In MATH 108, we consider the *how* but also, when possible intuitively, the *why*. In a college course, both process (i.e., understanding) and result are important. It also would be a mistake for you to assume this course for nonmajors, MATH 108, is an easier calculus course than the course for majors, MATH 111. You should merely regard it as a different calculus course.

My teaching style is basically lecture, but I allow for openness in class through questions, humor, stories, and occasionally tangents. However, this open style should not be allowed to mask the overriding course goal of a significant and serious educational experience.

Warning

I realize that my handwriting is poor. Although I attempt to make it legible, I do not always succeed. You will not offend me by asking me to interpret something that I have written on the board. To compensate for my poor handwriting, I try to say everything that I write on the board.

My Expectations of Students

I take seriously my responsibilities in this class and expect you to do the same. The following expectations are reasonable for a college course.

- Your most important responsibility, while enrolled at Messiah, is to your courses.
- Attend every class.
 - If you have an excused absence, you may obtain missed handouts in my office.
 - If you are absent when a graded item is returned, it can be retrieved only in my office.
- Be punctual and ready to begin class on time.
- Do not let the time that the class meets negatively influence your attendance and attitude.
- Read the assigned sections in the text.
- Take complete notes. At a minimum, this includes everything that I write on the board.
- Use your notes, handouts, and suggested homework – not your text – as your primary reference for content and method.
- Do as many exercises as is necessary to achieve mastery.
- Review notes and handouts after each class to ensure a smoother transition from one lecture to the next.
- Ask questions when necessary.
- Seek help as soon as difficulties become evident and accurately inform your parents and advisor.
- Use all resources available: in-class lectures, question opportunities, and problem sessions; office consultations, help sessions, and your textbook.
- All electronic devices (e.g., cell phones) are turned off and not used during class.
- Out of respect for God's word, be attentive during the devotional time at the beginning of class.