

Syllabus

Author : admin

General Information



Title: MAT 136: Calculus I

Semester: Fall 2012

Credits: 4

Section 6

Time: MWThF at 12:40-1:30PM

Location: AMB 223

Section 9

Time: MWThF at 1:50-2:40PM

Location: AMB 221

Instructor Information

Instructor: Dr. Dana C. Ernst

Office: AMB 119

Office Phone: 928.523.6852

Email: dana.ernst@nau.edu

Office Hours: MWThF at 11:30-12:30PM and M at 3:00-4:00PM (or by appointment)

Webpage: <http://danaernst.com>

Course Information and Policies

Prerequisites

MAT 125 or MAT 125H with a grade greater than or equal to C or satisfactory mathematics placement.

Catalog Description

Calculus of one variable; basic concepts, interpretations, techniques, and applications of differentiation and integration. Letter grade only. Course fee required.

Additional Information

This course fulfills a requirement in the Science/Applied Science distribution block in the University Liberal Studies program. It supports the mission of the program to prepare students to live responsible, productive, and creative lives as citizens of a dramatically changing world through the study of Calculus and its applications. Essential skills in this course are critical thinking, quantitative reasoning, and scientific reasoning. This course is also a certified [First Year Learning Initiative](#) course.

Textbook

Our textbook will consist of a course pack called *Calculus I Lecture Notes* by J. Neuberger, N. Sieben, and J. Swift. The course pack is available for purchase at [Alphagraphics \(12 N. Beaver Street\)](#) for less than \$10. In addition, you will occasionally be provided with other course materials. You are welcome to utilize other books covering first semester calculus.

I expect you to be *reading* the textbook. I will not be covering every detail of the textbook and the only way to achieve a sufficient understanding of the material is to be digesting the reading in a meaningful way. You should be seeking clarification about the material in the textbook whenever necessary by asking questions in class or posting questions to the course forum on [Bb Learn](#).

Purpose

The primary objective of this course is to aid students in becoming confident and competent in solving problems that require techniques developed in calculus. Successful completion of MA2550 provides students with skills necessary for upper division mathematics courses, such as MA2560: Calculus II. In general, calculus is a study of functions. The main tools are differentiation, which measures instantaneous change in a function, and integration, which gauges the cumulative effect of that change. The crowning achievement of first semester calculus is the Fundamental Theorem of Calculus, which explains how differentiation and integration are related. Students will have a working understanding of limits and continuity. Students will also be able to utilize various techniques to differentiate and integrate numerous functions including trigonometric functions. In addition, students will understand and be able to apply the Mean Value Theorem, the First and Second Derivative Tests, and the Fundamental Theorem of Calculus in both theoretical problems and applications. Also, the purpose of any mathematics class is to challenge and train the mind. Learning mathematics enhances critical thinking and problem solving skills.

Learning Outcomes

Upon successful completion of the course, the student will be able to:

1. Demonstrate an understanding of the concepts of limit, derivative and integral in writing, and graphically.
2. Calculate, or approximate as appropriate, the limit of a function using appropriate techniques including l'Hospital's rule.
3. Find the derivative of elementary polynomial, exponential, logarithmic and trigonometric functions.
4. Use rules of differentiation including the power rule, product rule, quotient rule, chain rule, and implicit differentiation to compute the derivative of a function. Obtain expressions for higher order derivatives of a function.
5. Interpret the derivative as the instantaneous rate of change and as the slope of the tangent line.
6. Apply the derivative to find the line tangent to a function at a point and the linearization of a function at a point.
7. Apply the derivative to analyze graphical behavior of a function, motion problems, other rate problems, and optimization problems.
8. Construct a definite integral as the limit of a Riemann sum and use the sum to approximate a definite integral.
9. Find the anti-derivative of elementary polynomial, exponential, logarithmic and trigonometric functions.
10. Use substitution to find the anti-derivative of a composite function.
11. Evaluate a definite integral and interpret an indefinite integral as a definite integral with variable limit(s) in order to evaluate it.
12. Apply the definite integral to analyze the area under a curve and motion problems.
13. Apply the Fundamental Theorem of Calculus.
14. Apply differentiation and integration in setting up and critically evaluating hypotheses in the fields of science, engineering and technology.

Homework

We will have two types of homework assignments.

- **Daily Homework:** Usually, Daily Homework will be assigned every class session and will be due by the beginning of the next class session. The majority of the Daily Homework assignments are to be completed via [WeBWork](https://kiva.math.nau.edu/webwork2/) (<https://kiva.math.nau.edu/webwork2/>), which is an online homework system. Once on the main WeBWork page, click on [DErnst_136](#) to access the WeBWork homework for our class. You should log in with your NAU credentials. There will likely be some growing pains associated with getting used to the online homework system, so we should all plan to be patient with each other as we get used to the system. We will discuss the use of WeBWork more during the first few class sessions. In addition to the problems done online, you will also be asked to occasionally submit written work. Each exercise (WeBWork or written) from the Daily Homework will be worth a point. Unless a student has a documented excused absence, late Daily Homework will not be accepted.

However, if necessary, the scores will be "curved."

- **Weekly Homework:** Mathematics is about so much more than cranking out answers to assigned exercises. Having the ability to appropriately convey a mathematical argument is equally as important as "getting the right answer." In fact, I would argue that it is one of the most important reasons for learning mathematics. Each week, you will be required to submit carefully written solutions to a selection of problems. The Weekly Homework will be graded for more than the correct answer. In particular, intermediate steps will be graded, as well as your ability to present a complete solution. Moreover, your write-ups should be neatly written and make proper use of mathematical notation. The problems for your Weekly Homework will cover a subset of material covered the previous week. This will provide you with an opportunity to reflect on previous material and to deepen your understanding. Sometimes the problems will be identical to problems that you have already done and sometimes they will be new. Typically, the Weekly Homework assignments will be due on Wednesdays. Each Weekly Homework assignment will be worth 10 points, regardless of the number of problems. You are allowed to submit up to two late Weekly Homework assignments with no penalty. Also, two of your lowest Weekly Homework scores will be dropped.

Your grade on the homework category is calculated by taking your total points and dividing by the total number of possible points. Your homework score is worth 15% of your overall grade. You are allowed and encouraged to work together on homework. However, each student is expected to turn in his or her own work.

Midterm Exams

There will be 4 midterm exams, which are *tentatively* scheduled for the following dates: **Friday, September 21, Friday, October 12, Friday, November 2, and Friday, November 30**. Each exam will be worth 15% of your overall grade. There will also be a *cumulative* final exam, which will be on **Monday, December 10 at 12:30–2:30PM** for Section 6 and **Wednesday, December 12 at 12:30–2:30PM** for Section 9. The final exam is worth 20% of your overall grade. Make-up exams will only be given under extreme circumstances, as judged by me. In general, it will be best to communicate conflicts ahead of time.

Gateway Exam

Sometime around the middle of the semester, we will have a skills-based exam, called a Gateway exam. The exam will consist of 10 short computational problem. Within reason, the class will retake the exam until everyone achieves 8/10 or better.

Attendance

As per university policy, attendance is *mandatory* in all 100-level courses, and in particular, I am required to record attendance each class session. Daily attendance is vital to success in this course! You are responsible for all material covered in class, regardless of whether it is in the textbook. Repeated absences may impact your participation grade (see below). Students can

find more information about NAU's attendance policy on the [Academic Policies](#) page.

Exploration Activities and Participation

Throughout the semester, class time will be devoted to students working on Exploration Activities. The purpose of the Exploration Activities is to either reinforce/synthesize previously introduced concepts or to introduce new concepts via student-driven inquiry. Occasionally, students may be asked to complete these activities outside of class. If necessary, these activities will be graded. In addition, there may be other miscellaneous in-class activities.

I expect you to participate and engage in class discussion. Moreover, I will occasionally ask for volunteers (or call on students) to present problems at the board. No one should have anxiety about being able to present a perfect solution to a problem. In fact, we can gain so much more from the discussion surrounding a slightly flawed solution. However, students should not volunteer to present a problem that they have not spent time thinking about. Your overall participation includes your willingness to present, engagement in class discussions, and consistent attendance record.

Your work on the Exploration Activities and participation are collectively worth 5% of your overall grade.

Basis for Evaluation

In summary, your final grade will be determined by your scores in the following categories.

Category	Weight	Notes
Homework	15%	For Daily Homework, each exercise (WeBWork or written) is worth one point. For Weekly Homework, each assignment is worth 10 points regardless of length. Your grade is determined by dividing your total points by the total possible points.
Exploration Activities and Participation	5%	Based on the work done on Exploration Activities, as well as your presentations, engagement in class discussions, and attendance.
4 Midterm Exams	60%	Each exam is worth 15%.
Final Exam	20%	The final exam is cumulative.

Grade Determination

In general, you should expect the grades to adhere to the standard letter-grade cutoffs: A 100-90%, B 80-89%, 70-79%, D 60-69%, F 0-59%.

Additional Information

Department and University Policies

You are responsible for knowing and following the [2012 Department of Mathematics and Statistics Policies](#) (PDF) and other University policies listed at <http://www4.nau.edu/avpaa/UCCPolicy/plcystmt.html>. More policies can be found in other university documents, especially the [NAU Student Handbook](#) (see appendices) and the website of the [Office of Student Life](#).

Class Etiquette

Students are expected to treat each other with respect. Students are also expected to promote a healthy learning environment, as well as minimize distracting behaviors. In particular, you should be supportive of other students while they are making presentations. Moreover, every attempt should be made to arrive to class on time. If you must arrive late or leave early, please do not disrupt class.

Please turn off the ringer on your cell phone. I do not have a strict policy on the use of laptops, tablets, and cell phones. You are expected to be paying attention and engaging in class discussions. If your cell phone, etc. is interfering with your ability (or that of another student) to do this, then put it away, or I will ask you to put it away.

About Calculators and Other Technology

I am a huge fan of technology and believe that when it is used appropriately, it can greatly enhance one's learning experience. However, when learning, technology should never replace one's own amazing cognitive abilities. When we are discussing concepts in class or when you are doing homework, you should feel free to use whatever resources you feel will help you understand the concepts better. So, feel free to use things like [Sage](#), [Wolfram|Alpha](#), [Mathematica](#), your graphing calculator, etc. when doing homework. However, on exams **you will only be allowed access to a basic 4 operation calculator** (for doing arithmetic). In particular, the use of **graphing calculators will not be allowed on exams**.

Moreover, be warned that I am much more interested in the process by which you arrived at your answer than the answer itself. An answer to a homework or exam question that is correct but lacks justification may be worth little to no points. If you understand a concept, then barring a silly computational error, the correct answer comes along for the ride. Yet, getting the correct answer does not imply that you understand anything!

Getting Help

There are many resources available to get help. First, I recommend that you work on homework in groups as much as possible. Second, you are strongly encouraged to ask questions in the course forum on [Bb Learn](#), as I (and hopefully other members of the class) will post comments there for all to benefit from. You can also encouraged to stop by during my office hours and you can always [email me](#). Lastly, *free* tutoring is available in AMB 137 through the [Math Achievement Program](#).

Important Dates

The last day to drop/add is **September 6** (no W appears on transcript). The last day to withdraw from courses is **October 26**.

Changes to the Syllabus

Any changes in this syllabus made during the term will be properly communicated to the class.

Closing Remarks

When does the learning happen? It might happen in class, but most likely it happens when you sit down to do your homework. Most of you can follow what happens on the board in class, but the question is, can you do it on your own? To learn best, you must struggle with mathematics on your own. It is supposed to be difficult. However, if you are struggling too much, then there are resources available for you. I am always happy to help you. If my office hours don't work for you, then we can probably find another time to meet. You can also get help from each other. Get a study buddy! Help each other learn. It is your responsibility to be aware of how well you understand the material. Don't wait until it is too late if you need help. *Ask questions!*