Professor: David McClendon (2046 ASC, phone x2574 (231-591-2574 off campus), hours M 10-11, T 10-11, W 3-4, R 1-2, or by appointment, email: DavidMcClendon@ferris.edu)

Web: I maintain a personal web page at http://mcclendonmath.com/220.html; this page contains handouts, old exams, and lecture notes. I do not use Canvas.

Lectures: Section 3: MTWR 12:00-12:50 PM in STR 137.
Section 5: MTWR 2:00-2:50 in STR 137.

Required materials: You need two items for this course:

1. My lecture notes, which can be obtained in either of two ways:
   - as a course pack, available at the bookstore; or
   - online, at my web page (see above for URL) as a pdf file

   You should bring the appropriate section of lecture notes to class every day as they contain the examples and notes from which I will teach the course.
2. A piece of software called *Mathematica*; a link to the site where you can purchase a license for this software is on my web page.

I also recommend bringing a couple of colored pens or pencils to class each day, as some of the pictures we will draw to explain concepts are much more easily understandable when drawn in color.

Prerequisite: MATH 126 or 130 with a grade of C- or better. Essentially this means algebra and trigonometry. Some of this information will be reviewed in the first week of class (see Chapter 1 of the lecture notes).

Course material: Functions, limits, differential calculus of functions of one variable, an introduction to the Riemann integral, and applications.

Learning outcomes: After completing MATH 220, it is my hope and expectation that students understand what calculus is–that is, that students know the difference between mathematics that is and is not calculus, and that given some problem solved by calculus techniques, students can identify the approximation to the solution, the parameter of the approximation, and the limiting procedure which produces the solution.

It is also my hope and expectation that students will be able to:

1. Explain why a given limit, derivative or integral does or does not exist.
2. Infer information about a function from a limit statement, derivative or integral.
3. Estimate limits, derivatives, and integrals numerically and graphically, using technology as appropriate.
4. Compute limits, derivatives, and integrals, using technology as appropriate.
5. Solve problems which apply limits, derivatives and integrals, using technology as appropriate.

Grading policy: Attendance / class participation: 4%. Quiz average: 9%. Lab assignments: 9%. Four midterm exams: 15% each. Final exam: 18%. Grades are curved at the end of the semester, but an average of 90% guarantees you at least an A-, an average of 80% guarantees you at least a B-, etc.

Extra credit: I offer extra credit to students who can identify typos or other errors in the lecture notes, errors in homework answers, etc. (the first student to find each goof gets the credit). The more issues you find, the more extra credit you earn.

Attendance policy: I have no formal attendance policy. That said, **nothing** is more correlated with strong performance in my classes than attendance in lectures.

Homework: Each section of my lecture notes has associated practice problems in my lecture notes (located at the end of each chapter, with answers provided). When we finish each section, you should do the problems from that section. These assignments are not collected for a grade, but it is important to do them, as they are your best preparation for quizzes and exams.

Quizzes: There will be frequent quizzes in this class, which cover material we have discussed since the most recent quiz or exam. Some will be take-home quizzes. These quizzes are due two classes after they are assigned, at the beginning of class.

On take-home quizzes, you may use your notes, and you can use a calculator or *Mathematica*. However, you need to show sufficient work, and you should be advised that on exams you will have to do similar problems without the aid of technology.

On take-home quizzes, you may **not** get help from other people and may **not** use other textbooks, apps or internet searches (it will be obvious if you do).

Some quizzes are done in class. These are ≤ 10 minutes long and on these, you will not be allowed to use notes, a calculator or computer, or any study aids.

The worst one-fourth of your quiz grades get dropped and the others are averaged to form your quiz average.

No makeup quizzes are given. If you miss a quiz, you will get a 0 which will be one of the grades you drop.

Lab assignments: On certain days, you will be given a lab assignment which requires you to use the computer package *Mathematica*. You will be given time during the class session to start the lab, but will be required to finish the lab on your own time. These labs are usually due one week after they are assigned, and are graded for correctness.

Midterms: There are four midterms given in class on the dates listed on the course calendar. You will not be permitted to use any study aids, calculators or computers on the exams. The midterms are not directly cumulative, but mathematics is "inherently cumulative".

You may make up an exam that you miss (whether your absence is excused or not) but the makeup exams may be considerably more difficult. If you miss an exam, contact the professor; you are to make up the exam at the *earliest possible time*.

Final exam: The final exam is optional.

- If you choose not to take the final, then for your final exam grade I will enter the average of your two lowest midterm exam grades.
  Example: your midterm exam grades are 70, 80, 90 and 100. If you do not take the final, I give you 75% on the final.

- If you take the final and your score is worse than the average of your two lowest midterm exam grades, I ignore your final exam score and for your final exam grade I will enter the average of your two lowest midterm exam grades.

  Example: your midterm exam grades are 70, 80, 90 and 100. You take the final and score 67%. I give you 75% on the final.

- If you take the final and your score is better than the average of your two lowest midterm grades, then your final exam score counts.

  Example: your midterm exam grades are 70, 80, 90 and 100. You take the final and score 82%. I give you 82% on the final.

The final is cumulative and has the same structure as the midterms, but is twice as long.

Technology usage: Calculators are never, ever, ever permitted on any quiz or exam; questions on quizzes and exams use "easy" numbers and expressions that a calculus student should reasonably be able to compute and manipulate by hand. That said, we will learn how to use a software package called *Mathematica* which you will use on lab assignments and in some of the homework. The midterm exams include some basic questions involving *Mathematica* syntax.

Office hours / Getting help: My official in-person office hours, held in ASC 2046, are Tuesdays from 10-11 AM and xxx from xxx PM. Outside those hours, I am happy to meet with you most of the time when I am present. Feel free to ask me questions on lecture content, or to get help with any or all of the homework questions, and I can also videoconference with you through Zoom or Skype if needed. In office hours, I am able to discuss the material at a much more friendly pace and offer some alternate viewpoints that may help you understand the material better.

Additionally, the Academic Support Center (FLITE 120, x3543, asc@ferris.edu) may offer free tutoring as well. To schedule a (virtual) appointment with a tutor, you can use the online scheduling tool Navigate. I can also recommend tutors that you can hire.

Students with disabilities who require reasonable accommodations to fully participate in course activities or meet course requirements should register with the Disability and Accessibility Resource Center office (x3057, DARC@ferris.edu). While DARC will send me a letter outlining the accommodations to make for you, I would appreciate it if you could contact me immediately for assistance with any necessary classroom accommodations.

Academic dishonesty: Papers will be monitored for "magic answers". Issues with academic dishonesty are taken very seriously, will almost always result in an F for the class, and will be referred to the Office of Student Conduct.

DATE	LAB DUE	TOPIC	ASSOCIATED PROBLEMS
M 8.26		Course introduction	
T 8.27		1.1-1.2: Review of exponent rules	(1.5) 1-4
W 8.28		1.2-1.3: Review of functions and lines	(1.5) 5-19
R 8.29		1.4: Review of trigonometry	(1.5) 20-25
M 9.2	*No class - Labor Day*		
T 9.3		*Mathematica* lab 1: introduction and troubleshooting	
W 9.4		2.1: Introducing limits	(2.4) 1-5
R 9.5		2.2-2.3: One-sided and infinite limits	(2.4) 6-34
M 9.9		*Mathematica* lab 2: functions and graphs	
T 9.10	Lab 1	3.1-3.2: Continuity	(3.5) 1-2
W 9.11		3.3: Evaluation of limits at infinity	(3.5) 3-17
R 9.12		3.4: Evaluation of limits	(3.5) 18-37
M 9.16	Lab 2	3.4: More on evaluating limits	(3.5) 38-51
T 9.17		*Mathematica* lab 3: limits	
W 9.18		4.1: Introducing derivatives	(4.4) 1-4
R 9.19		4.2: Limit definition of the derivative	(4.4) 5-12
M 9.23		4.3: Estimating derivatives	(4.4) 13-21
T 9.24	Lab 3	*Mathematica* lab 4: introducing derivatives	
W 9.25	**EXAM 1 - covers Chapters 1 to 4**		
R 9.26		5.1-5.2: Elementary differentiation rules	(5.6) 1-16
M 9.30		5.3: Trig derivatives	(5.6) 17-26
T 10.1	Lab 4	5.4: Exponential and logarithmic functions	(5.6) 27-30
W 10.2		5.4: Derivatives of $\exp$ and $\ln$	(5.6) 31-46
R 10.3		5.5: Higher-order derivatives	(5.6) 47-71
M 10.7		6.1-6.2: Product and quotient rules	(6.8) 1-25
T 10.8		6.3-6.4: Chain Rule	(6.8) 26-74
W 10.9		*Mathematica* lab 5: derivative rules	
R 10.10		6.5: Implicit differentiation	(6.8) 75-90
M 10.14	*No class - Fall Break*		
T 10.15	*No class - Fall Break*		
W 10.16	Lab 5	6.6: Derivatives of $\arctan$ and $\arcsin$	(6.8) 91-96
R 10.17		Review and catch-up	
M 10.21	**EXAM 2 - covers Chapters 5 and 6**		
T 10.22		7.1: Introducing optimization problems	(7.5) 1-10
W 10.23		7.2: Language associated to optimization	(7.5) 11-16
R 10.24		7.2: Theory of optimization	(7.5) 17-40
M 10.28		7.3: Tone and concavity	(7.5) 41-58
T 10.29		*Mathematica* lab 6: classifying critical points	(7.5) 59-63
W 10.30		7.4: More on optimization	(7.5) 64-72
R 10.31		*Mathematica* lab 7: optimization	
M 11.4		8.1: Tangent line and quadratic approximation	(8.4) 1-29
T 11.5	Lab 6	8.2: L'Hôpital's Rule	(8.4) 30-43
W 11.6		8.3: Newton's method	(8.4) 44-61
R 11.7		Review and catch-up	
M 11.11	**EXAM 3 - covers Chapters 7 and 8**		
T 11.12	Lab 7	9.1: Area and displacement	(9.6) 1-4
W 11.13		9.2: Riemann sums	(9.6) 5-21
R 11.14		9.3: Definition of the integral	(9.6) 22-32
M 11.18		*Mathematica* lab 8: Riemann sums	
T 11.19		9.4: Properties of integrals	(9.6) 33-36
W 11.20		9.5: Fundamental Theorem of Calculus	(9.6) 37-52
R 11.21		10.1: Evaluating basic integrals	(10.5) 1-32
M 11.25	Lab 8	10.2-10.3: Rewriting the integrand	(10.5) 33-42, 48-52
T 11.26		*Mathematica* lab 9: integration	
W 11.27	*No class - Thanksgiving*		
R 11.28	*No class - Thanksgiving*		
M 12.2		10.3: u-substitutions in indefinite integrals	(10.5) 53-58, 60-63
T 12.3	Lab 9	10.4: u-substitutions in definite integrals	(10.5) 43-47, 59, 64-69
W 12.4		Review and catch-up	
R 12.5	**EXAM 4 - covers Chapters 9 and 10**		
T 12.10	**FINAL EXAM (12 PM section): 12:00 PM in STR 137**		
W 12.11	**FINAL EXAM (2 PM section): 2:00 PM in STR 137**		